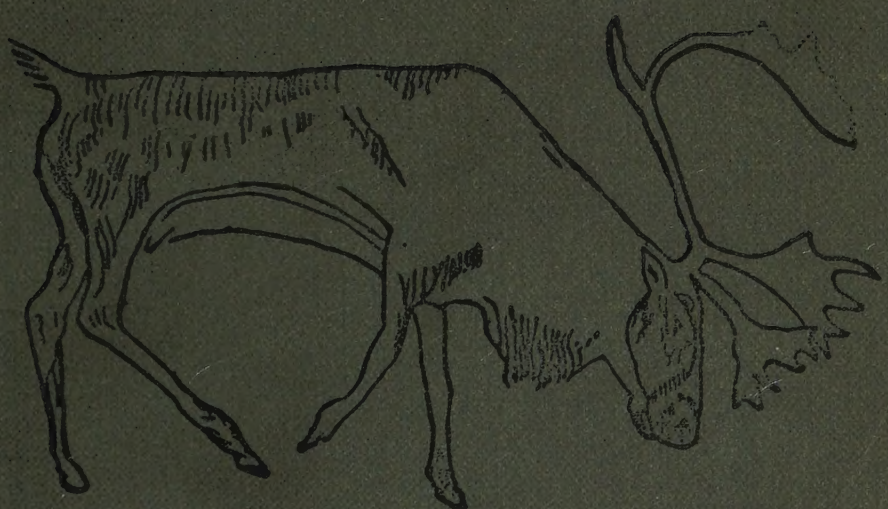
Stone Bronze and Iron Ages



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THE

STONE BRONZE AND IRON AGES

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THE

STONE BRONZE AND IRON AGES

A Popular Treatise on Early Archæology

BY

JOHN HUNTER-DUVAR

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PREFACE.

Inquiry into Early Archæology is comparatively new, yet so much information has been garnered therein that it is difficult to compress an outline within the limits of one little book. No study of which the materials are within easy reach will be found more fascinating. The pursuit of this branch of ethnology will furnish the amateur with out-door recreation, curios to adorn his cabinet, and *data* from which to frame intellectual deductions. As this book claims to be no more than a popular treatise, pains have been taken to give it that character. The subject is dealt with to date. To avoid overloading the text, the writer has not thought it necessary to distinguish his individual views from those generally accepted. Those opinions are subject to amendment by the thoughtful reader.

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The Stone, Bronze, and Iron Ages.

CHAPTER I.

EARLY ARCHÆOLOGY.

Geological Periods.—Mammoth Animals appear in the Tertiary.—Man in the Post-tertiary.

ARCHÆOLOGY, from the Greek words *archaios*, ancient, and *logos*, a discourse, treats, in its widest sense, of the origin, old manners, customs, productions of the arts, as also of the religion, laws, literature, and other early institutions of any people. Until of late these studies were known in the aggregate as "antiquarian," but now the several branches are designated by distinguishing names, as ethnology, mythology, folk-lore, and the like. In a limited sense, Early Archæology, apart from works of skill, deals with extant data of prehistoric life or manners, such as unhewn monumental stones, cave and other habitations, mounds, sepulture, weapons, implements, boats, also organic remains of man and animals, with everything, in short, that can throw light upon the condition of a perished or transformed people. Careful

comparison of specimens from all parts of the world, from both hemispheres and the islands of the sea, have caused it to be accepted as fact that mankind in the earliest stages passed through progressive changes, from the use of wooden clubs as weapons of offence to flint implements, thence through several gradations to crude manufactures in copper, and afterwards in iron, before any date when the term "civilization" could be at all truly said to be applicable. As far back as one century before Christ, Lucretius, a Latin poet, had summed the case in lines which may be thus rendered :—

> "Man's earliest weapons were fists, nails, and teeth,
> With stones, and clubs torn from the limbs of trees;
> His next material was when copper found;
> And latest period was when iron known."

In what sequence of years these materials came respectively into use will be discussed in later chapters of this book. The initial date is when man himself first appeared on the scene. To the question, *when* did he appear? a reply that convinces, as far as present knowledge discloses, is given by geology in "the testimony of the rocks."

Geology divides the progressive creation of the world into five grand periods, each further arranged into subdivisions not necessary here to recapitulate. Out of the wild chaos of heat and moisture in which science believes the universe originated, order gradually arose. Bleak plutonic islands sprang from the face of the great deep, and other terrene materials were formed in nature's alembic. Afterwards, from continued exercise of con-

structive power, were produced semi-fluid combinations of carbon (protoplasm), the existence-germ. Imperceptibly, nascent life developed in progressive growths, which for convenience sake are here shown under geological periods.

Coming down the stream of time we pass through the—

AZOIC, or lifeless period.

PRIMARY. Animal life:—crustacea, acephalous vertebrata.

SECONDARY. Huge saurians.

TERTIARY. Huge mammalia, as mastodons and mammoths, rhinoceros, hippopotamus also large carnivoræ.

POST-TERTIARY; or Quaternary. Survivors of huge mammalia from previous period. Divers animals approaching now existing types. MAN.

SINCE THEN, man having passed through the, so-called, Ages of Stone and Bronze into the Age of Iron, has continued to advance in civilization. Giant mammals have become extinct and existing types established.

Arguments have been recently advanced that man existed on the coast of the Pacific in the tertiary period. While it is always hazardous to refuse the hypotheses of science, the supposition above offered may be received with reserve.

It will be borne in mind that in the progressive

development of the world, much of the animal and vegetable life of one geologic period gradually dies out and becomes extinct, or is modified, in the period succeeding. Organic remains of any race of animals are therefore only found in the strata of that particular period in which they came into existence, through which they lived, in which they died and became a race extinguished. Remains of that particular race cannot by any possibility be found in formations prior to the one in which it came into existence, nor (except by displacement) in those subsequent to the period when the race became extinct from changed conditions of the earth. Nothing can be more clear and convincing, nor less liable to error, than the testimony of the strata. Hence, as there exists no single instance of any vestige of man or of his works in any geological formation prior to the post-tertiary, it is conclusive that it was no earlier than that period, when the earth had become adapted to the existence of Man, that man was created, or made.

It is beyond the scope of this treatise to account for the appearance of man. Mr. Darwin and his commentator, Professor Huxley, have promulgated a theory that has met with much acceptance. Suffice it to say that two features strike us; namely, if man was evolved from the ape, it must have been either from one single instance or from a general evolution of the species, and if from the evolution of many the uniformity in the type evolved is marvellous. The other is, that, whether from a single pair or from a general nobilization of species, the new form of animal, man, must have taken vast lengths of

time to have spread over the world with the identity of manners that his relics make it apparent prevailed. Geologists cannot even approximate the countless æons that have elapsed since the earth first took form, inasmuch as they have no semblance of data to go upon beyond the relative thicknesses of the various crusts, and against this must be set the insurmountable objection that they cannot know whether or not the constructive force always maintained a uniform degree of intensity. In estimating the lapse of years since man occurred in the post-tertiary, the hypothetical guide of surface strata is equally invalid. Taking, as example, the three or four thousand years during which events have been recorded by symbol or letters, they present no notable change in the face of nature. Surmise is reasonable that (excepting what change arises from cultivation) the natural surroundings of mankind for thousands of years past have not differed materially from what now exist. Throughout millenniums men multiplied until they occupied great spaces of the earth's surface, and evidently in the same uncivilized state, until the accidental discovery of metal enlarged their ideas and gave an impetus to their intellectual advance. It is with this long monotonous period of slow progression that Early Archæology has to deal. When utensils began to be fanciful in shape the rudiments of Art had sprung, and when progress was put on record it became History. Classified therefore by prehistoric industries, the past of the world ranges itself in three eras, spoken of by the names of the industrial materials used—namely, flint, copper, and iron—as—

The Age of Stone.
The Age of Bronze.
The Age of Iron.

In the geological quaternary period, and during the existence of man, natural phenomena, not explicitly accounted for by science, changed the aspect of the earth. Hyperboreal ice made its way to the most southern latitudes, and filled the plains—a glacial cataclysm. Periods of inundation, succeeding the recurrence to a higher temperature, hollowed out the valleys and deposited banks of washed gravel, in which "drift" the earliest handiworks of man have been discovered, in the shape of rude clubs of flint. Man and the mastodon[1] both survived the devastation, although bones of both have been found mingled in the river drift. To this earliest period is given the name of *palæolithic*, or Older Stone Age, and to that succeeding it *neolithic*, or Newer Stone Age. A subdivision of the stone age into three terms of time that may serve as a guide in popular study has been suggested; namely,—

1. Epoch of extinct animals (or cave-bear and mammoth period).
2. Epoch of migrated existing animals (or reindeer period).
3. Epoch of existing domesticated animals (or polished-stone period).

Then followed the epochs of working in metals.

[1] The words mastodon and mammoth are used loosely to mean the giant mammals generally.

Unlike the exact sciences, wherein every problem carries its proof within itself, anthropology, of which our subject is a branch, allows a latitude to the imaginative powers. Says Charles Kingsley, "No definite assertion of certainty can be made in early archæology, the nearest approach to it can be but 'I think so.'" And to quote Professor Huxley, "Do not allow yourself to be misled by the common notion that a hypothesis is untrustworthy simply because it is a hypothesis. . . . What more have we to guide us in nine-tenths of the most important affairs of daily life than hypothesis?" From which it must not be deduced that archæological studies are based on mere guess-work or anything like it. Every opinion advanced, to be of any value, must be shown to have the reasonable probability that such a circumstance, with its dependent corollaries, was just so, and could not have been anything else without a violation of likelihood. This is indeed the vital principle of circumstantial evidence on which decisions of importance are framed in our courts of law. In the present state of our knowledge evidence may be incomplete in detail, but every additional investigation clears some point from more or less of obscurity, and provides new data from which to arrive at an accurate conclusion. And, in fact, this room for ingenuity of reasoning adds a charm to the study.

The visible relics of the *autochthones*, or earth-begotten, although of the utmost value as a basis, form but a small portion in the study of early anthropology. Man's longevity, physical and mental capacity, language, migration, increase, and decrease, with many other topics,

afford exhaustless subjects for investigation, but none of them come within the compass of this little book.

Let none be deterred from the fascinating study of Early Archæology by an apprehension that the facts it discloses may clash with opinions they have been taught to revere. Hasty assertions have indeed been made that its pursuit may lead into devious ways of thought; but the cry of alarm comes mainly from persons unacquainted with the subject, or who think that *all* knowledge is dangerous except in the hands of the few. *Audi alteram partem.* There is no story without two sides, were they but flat contradiction and assertion, and patient and judicial must be the investigation before truth absolute can be arrived at—before appearances can be reconciled with fact. Many estimable minds have an anxiety to "reconcile science with religion," by religion being meant revelation; but there can be no reconciliation where there is no quarrel. Science cannot by any possibility be irreligious, inasmuch as its sole object is to become acquainted with the beautiful processes of nature, and any wondrous truth disclosed *is* a revelation. Scripture nowhere says that this earth was created just 6,000 years ago, yet the statement has somehow become embedded among the articles of belief, and any attempt to show that Man has occupied a habitable world for longer than that period is regarded as profane. Excepting among the most narrow of minds, it is admitted—if reluctantly, yet not denied—that man may have passed through various progressions, yet some would condense these progressions within an inspired chronology of their own.

Thus, Tubal-cain, they say, was a worker in brass (bronze) on a date they specify. Faced by this declaration, archæology, calling geology to its aid, largely extends the comparative eras, and the largest minds find that reasonable inference is not incompatible with an historic faith. Claiming greatly lengthened periods of progress, archæology disclaims any design of throwing doubt on revelation, and approaches with reverence all tenets of faith.

CHAPTER II.

PRIMEVAL MAN.

Civilization not necessary to Man.—His real Wants only Food and Shelter.—How he supplied them.—Not a giant Race.

Civilization is but a superfluity of unnecessary surroundings. The essentials of life are solely food and shelter, with an extension of "shelter" in the shape of clothing in cold climates. All the so-called inferior creatures are content with the two first-named. Gregarious animals further require amusement, that is to say, companionship. Man, so far as mere existence, needs no more. If we catalogue the instincts that are inherent in man, we shall find them few, and covering little beyond cunning to acquire and ferocity to defend. Most other qualities are offshoots from these. Even the paternal, or rather maternal, love of offspring that pervades all animated nature is less intense in the human race than in many mammals lower in the scale of creation. Divest civilized man of his artificial wants, and how little remains? Shipwrecked mariners on desert islands have lived for years separated from their kind, and after the first feeling of loneliness—the craving of gregariousness—

had worn off, have passed an existence comparatively happy in the enjoyment of nothing beyond food and shelter. In like manner countless generations succeeded generations of primeval human beings without awakening in them any practical aspiration towards bettering their condition and improving their mode of life. The discovery of the bow and missile arrows, and the adoption of garments of dressed skins fashioned to the person instead of shapeless blankets of undressed pelt, are almost the only advances traceable until the sudden impulse of activity in metal-working, which occurred only when approaching near to historic, or at least traditionary times.

From analogy it is reasoned that man originated in the temperate zone. In his extension to the tropics a requisite would be shade, and in an arctic climate protection from cutting blasts. Cave dwellings would supply both these requirements, in a measure. Accordingly we find that at one time primeval men lived in caves. Experience would teach that such open shelters were liable to the intrusion of wild beasts, and, besides, residence in such places of refuge confined the inmates to one particular spot, and consequently to a limited range of food supply, man being then mainly carnivorous. When one locality failed in plenty, the dwellers had to vacate it and journey on. Hence arose the necessity for a shelter that could be used in migrations. The requirements were simple, merely a screen to keep out the weather and behind which fire could burn, for the oldest relics show traces that almost from the beginning men

were acquainted with the use of fire. Materials for such migratory shelter were everywhere at hand. A palisade of thickly needled boughs of coniferæ, torn off by muscular strength from the trunk, answered every purpose. Fire excepted, this is scarcely beyond the intelligence of apes. Hunters adopt the same expedient of temporary huts to the present day. In process of time a better material was observed in plenty in the woods. This was the bark of trees, especially of the white birch (*betula alba*), light, leather-like, almost indestructible by time. In great forests explorers will often come on huge fallen birch trees with bark intact, but if stepped on, the foot will crash through, the whole internal timber having ages ago turned to dust. Not much intelligence was required to see that it would be easier to carry light sheets of bark rather than large boughs of conifers, the chief characteristic of the savage being indolence and his *summum bonum* to lie about and do nothing. Such bark huts as primitive nomads lived in are not unknown at the present day, and (strange though it may read to dwellers in villas) the writer has found them watertight and comfortable. Tradition, which is a branch of archæology, associates the white birch with the red man's earliest dawn. The American poet Longfellow in his "Hiawatha" has well versified this. On moorland and plains where trees were scarce, the skins of beasts slaughtered in the chase and stretched on poles would serve for dwellings to the nomads of Europe. For transit of streams, where every waterway was fringed with willows, currachs or

coracles of wicker-work covered with skin would be the common medium of conveyance, as canoes were in the western world. Each utilised the material most plentiful and ready to hand. American savages had only to stitch together the two ends of a sheet of bark with the sinews of deer, and lo! a canoe, more portable and therefore more useful to wanderers than heavy boats of hollowed log could be. In times within the reach of history, with such slender craft as coracle and canoe did the Britons and Scandinavians put to sea along their stormy coasts, and the transatlantic aborigines

FIG. 1. Bark of Birch tree.

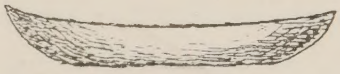


FIG. 2. Canoe.

sought to spear seals and salmon in the estuaries. Sailing vessels can hardly be imagined in the stone age, even on the fanciful theory of certain geographers that the earliest inhabitants of the western hemisphere were immigrants from Europe who came by sea along the 30th parallel of north latitude.

Cave dwellings were evidently earlier in point of date than outside habitations. Next came the occupation of migratory huts. To a later period, when men had come to associate in tribes and could labour in co-operation, may be assigned the structures of the American mound-builders and the Swiss lake-dwellers, the one tribe seeking safety behind artificial earthworks, and

the other in moated villages. Such precautions for security show that the land had become well peopled, and that the builders were afraid of enemies in numbers at least equal to themselves; that is to say, the tenor of life was already varied by wars. The earlier mound-builders and the dwellers in the water-hamlets of European lakes were in all probability of nearly the same stage of advancement, although not necessarily of identical chronological date. It is noticeable that no vestiges of lacustrine dwellings have been found in the great North American lakes.

The food of primeval man would for a long time seem to have been almost wholly animal, although supplemented, no doubt, with seeds of grasses, wild fruits, and roots. Savages have no prejudices against eating the flesh of flesh-eating animals, nor of reptiles and insects, so that their range of sustenance was large and the necessity for agricultural products small. True that when the first white men visited America they found the aborigines grew patches of maize, but this was in a later stage of advancement, when the red men had attained to a tribal policy and even to something of municipal government. Until Europeans had reached a like development, nearly as late as the beginning of the bronze age, their remains show no implements adapted to any process of agriculture, excepting some hollowed stones that may have served purposes of trituration. As a set-off it may be said that the rude hoes which they would have used, if they did stir the ground, would be but crutches of trees, perishable in a few years and leaving no vestige.

Wandering habits, moreover, argue against the supposition that they had any settled agriculture in the stone age. This inference gains strength from the fact of extensive shell-heaps (kitchen middens), left by tribes who, in the food scarcity of spring, assembled at the seaside to feed on shell-fish, returning again in autumn to lay in fish supplies for winter, and spending summer in the more plenteous larder of the woods. Agricultural pursuits were not likely among such a people. Not that primeval man was constantly on the move. On the contrary, a long isolated residence in one range would be required to produce so many tribes speaking distinct dialects as were found when history begins. It is beyond our scope to engage in the futile task of attempting to trace migrations or the causes that led to migratory tides. The successive waves of barbarism that have swept over Europe have obliterated such traces as we would have to seek even in later days. Tradition vaguely says something, and a comparison of the shape and ornamentation of weapons in the later period of barbarism indicates more, as to the channels in which migration has run. What little can be known, or surmised, from these indications strengthens the belief that the uncivilized world had grown populous, causing wars of aggression either from want of room or from innate savagery.

A theory has been advanced, that the earliest men, cotemporary with the huge animals that had survived the tertiary period, were a race of giants. Evidence contradicts this. It is true that several fragments of

human skeletons indicating large stature have been unearthed; but a considerable proportion of existing country Englishmen, notwithstanding the tear and wear of nerves and desuetude of muscles imposed by our artificial mode of life, are six feet in height. Individuals of much greater stature were in the ranks of Frederick of Prussia's grenadiers. Likely enough that in a savage state, where there was no mental strain and every physical power trained by necessity to the utmost, the proportion of tall men should be great, without supposing a uniform race of giants. "The survival of the fittest," too, must not be overlooked in the probability that only children of strong and healthy frame reached adult age.

The mind would lose itself in the mists of speculation in attempting to lay down from what initial point primeval man spread over the world. Evidence is, we think, patent that the earth had become populous before civilization had advanced beyond its first stage. Not only the continents but the belt of islands around both hemispheres offer testimony to man's presence in force. Were search made to-day for leaden bullets in the soil, as indicative of a race who used missiles of lead in their wars and slaughter of animals, how scanty a collection of specimens could be made. Of flint missiles how very many are turned up, and in localities how widely separated, tending to show either that the users of flint occupied the earth for an incalculably long time, or that they were more numerous than fancy can readily grasp,—or both conclusions in one. In our remarks on

primeval man, too, it must not be omitted that his condition of savagery and his gradual progress towards emergence therefrom were not alike all over the world. Changes could not have been simultaneous everywhere. Nor did the one age grow into another by mere lapse of time and fulness of maturity, as spring develops into summer and winter into spring. Circumstances might have thrown a dim ray of light on some tribe or locality earlier than it reached the bulk of mankind. Sufficient for this popular treatise to indicate that in all time the same forces were at work throughout the whole of human kind, and that in different terms of time and among different sections progression was making towards a fuller development, sooner or later.

Being careful to guard against fraudulent imitations, amateur collectors may garner a small cabinet of relics of primeval man that will be eminently suggestive, at small cost. Fragments of pottery of untempered clay, sun-dried or slackly baked by the flame of leaves; flint or other stone axes and hatchets (both known as "celts"); flint and other stone spear-heads; edged and pointed stone arrow-heads, in variety, with and without barbs,—among which do not omit the elf-bolt of white quartz, sometimes worn as a charm; flint flake-knives, chisels, borers, scrapers, with pebble-hammers, sling stones and sinkers; articles in horn and bone; similar weapons in copper and iron, with swords and knives of the same; together with specimens of later date showing ornamentation and therefore carrying us into

the demesne of art. The significance of each of these articles, and the story that may be woven with it, exceeds in interest any other intellectual "hobby" with which the writer is acquainted.

CHAPTER III.

MAN AND THE MASTODON.

Survival of Animal Life of the Tertiary Period.—Giant Graminivoræ, Carnivora and Reptiles contemporary with Man; who had to take his Prey by Cunning; sometimes himself a Prey; became nomadic.

THE animal life of the Tertiary geological period, when the earth was preparing itself for the reception of man, was different from any before or since. Among the features were giant mammalia, both graminivorous and carnivorous, that lived to great ages, also reptiles and amphibia of monstrous shape and bulk. Laying aside archæology for the moment, we must take a dip into natural history and become acquainted with those gigantic and ferocious creatures of some of which man afterwards became the contemporary.

In the early days when man first appears, by his remains, in the geological record, survivors of the typical gigantic forms of the previous period still abounded in the temperate zone even to the edge of the arctic. In Britain, then united with the continent of Europe, the tusked mastodon, a vegetable-feeding quadruped of the elephant species, some tons in weight, went in herds. Mammoths, ten or more feet in height and twenty in

length of body, wandered in the copses and pastures as elsewhere throughout the range of both hemispheres. The root-digging dinotherium, in shape like a huge mole eighteen feet in length, ploughed the marshy shores of lakes and rivers or anchored by its ponderous tusks to the bank. The woolly rhinoceros had its haunt in thickets by streams, and the hippopotamus in the sedges. Enormous short-legged sloths, such as the megatherium, in stature eight feet, with great rotundity and length of body and armed with powerful claws, crawled slowly along, uprooting trees to feed on the foliage. A colossal armadillo, the glyptodon, sheathed in mail, burrowed in the hillsides. Great bears, in bulk and stature equal to a drayhorse, and as fierce as the existing grizzly of north-western America, were numerous, having their lair in caves. No fewer than four species of lion-tiger, some of them as large as the tiger of Bengal, lurked in jungles and hollows of the rocks, sallying out to attack the mastodon and other large prey. Towards the close of the stone age tribes of ferocious hyenas extended from the continent into Britain, and, hunting in packs, killed and dragged the largest animals to their dens. Nor on land only was this formidable colossal life. The waters teemed with monstrous swimming reptiles and amphibia. The air-breathing, cold-blooded plesiosaurus swum close to the shore, or hiding among the reeds arched its long flexible neck, resembling the body of a serpent, and snapped at its prey. The ichthyosaurus, or great fish-lizard, with eyes a foot in diameter, glared from the shallows. The fierce mosasaurus and mastodonsaurus

were numerous along the east coast of England. Many of their remains have been found at Lyme Regis. The horned iguanodon, a reptile seventy feet long, with legs four or five feet in length and thicker than an elephant's, lay concealed in the grass, altogether a creature as ugly as a myth. Huge batrachians, or frog-like animals, hopped about, and have left their footprints on miry beaches now hardened into stone. The pterodactylus, a monstrous winged eft or flying dragon that might have been evoked from a distempered dream, flitted in the dusk. As Professor Buckland well observes: "With flocks of such-like creatures flying in the air, and shoals of no less monstrous ichthyosauri and plesiosauri swimming in the ocean, and gigantic crocodiles and tortoises crawling on the shores of primeval lakes and rivers, air, sea, and land must have been strangely tenanted in the early period of our infant world." These huge and strange forms, in their then shapes, have now fallen out of the scheme of creation.

Yet the world was not quite so weird, excepting in reptiles, as the above imaginative summary would picture. Many animals identical with existing types were to be found, as the bison, horse, boar, and reindeer. For reasons which geological changes explain, many of the more gruesome creatures died out in the Quaternary period. The earth gradually became more suitable for the predominance of man, and Man appeared. But in the early period of the human race some of the monstrous beasts of the preceding period still walked abroad; and when man could not overcome them he became their prey.

Such then was the condition of animal life from which man had to procure his supplies of food, and from which he had to protect himself. His limited strength was quite unable to cope with antagonists of bulk and ferocity, yet, wherever the line may be drawn between instinct and reason, he had the latter to put in competition with the propensities of the brutes. His own instinct would guide him to the idea of weapons of attack. Observation would speedily teach him to select the most suitable in the only ponderous material he was acquainted with; namely, stone. Brief trial would show the inefficiency of such weapons when merely thrown from the hand. We may here surmise that the next step in his reasoning would be induced by seeing that the resilient bough of a tree bent and suddenly let go, scattered the fruit to a distance. Hand slings would naturally follow. Cutting axes and spears would succeed with certainty to the stone club, and other improvements, such as barbs on weapons thrown, would develop. The invention of the bow and projectile arrows, involving as it does the combined principle of the darted spear and sling, was much later in coming into use.

Cunning sufficient for self-preservation is possessed and is manifested in a variety of ways by all animals according to the perils of their position, from those of the least complicated organisms to the highest of the *quadrumana*, or creatures with four hands. The two-handed man-animal has no innate practical ideas beyond those of his fellows that have hands terminating every limb. Experience derived from his gregarious habits carries him

farther. That is all. The difference, therefore, is, that man adopts and improves on the result of his past, while his congeners do not. Stealthiness and stratagem are the characteristics of the weak in every grade of animal. We naturally look then for stratagem in weak man placed in face of creatures more formidable than himself, but of which it was necessary he should make a prey. Customs of existing savages give us indication of what such stratagems would be. A pitfall placed in the "run," or customary track, of a herd of mastodons would be apt to capture one or more of those unmanageable beasts, in like manner as elephants were at one time taken in India. Even the rudest tribes visited by explorers have been found to be acquainted with pitfalls and springes for the capture of animals that they do not dare to face openly. A pitfall, it is unnecessary to say, is an artificial pit, or natural cleft or hollow, lightly covered with boughs, so that it gives way beneath the tread, and the animal that steps on it falls in and is helpless to escape. Once in the toil, the captive is beaten to death with clubs. Nor would the trap for crushing large game, and which is still in use among American forest-dwellers, under the appropriate name of a "dead-fall," be unknown. This simple but effective expedient is merely the trunk of a fallen tree placed on two props so slightly disposed that a large animal passing under displaces them and is crushed to death under the falling log. Many bears are taken in this way. Springes are also available in primitive hunting. The "spring deer-trap" is an artifice used in the Canadian woods by poachers,

who there, as here, destroy game in and out of season. Strange as the statement may seem, *cordage* is one of the earliest necessities of savage life, and among the most readily procurable. Apart from sinews of slaughtered animals, strips of hide make no bad substitute for rope; and the roots of the black birch (*betula nigra*), for instance, furnish yards of small whip stronger than hempen cord of equal thickness; and every tangle of vines would teach how to make knots. With seemingly inadequate means deer are still captured in wooded countries by the expedient of forcibly bending a slender tree with a running noose attached to a movable peg. Moss or other growth relished by deer being placed within the noose, the peg is displaced by the animal feeding, and the tree springs into an erect position, strangling the victim or suspending it by the antlers. Deer, horses, and other animals not ferocious could by concert of "beaters" be driven into morasses or defiles, and there slaughtered. All these stratagems were within the intelligence of primitive hunters; but whatever the method of securing live game of large size, the implements for giving the *coup de grace* would be clubs of stone. None of these modes of hunting would leave traces to our day, yet they were no doubt pursued. Indeed, early archæology has several walks of investigation yet unexplored. We do not remember, for example, any satisfactory experiments yet made with a view to ascertain whether at any period in the prehistoric stone age poison was used on flint arrow-tips.

During the ages when man was contemporary with the

mastodon, his weapons of stone were much heavier than when gigantic animals had died out and others more akin to existing types had come in. Manufacture of the more ponderous clubs shows little skill. All were framed on the idea of a heavy mace, club-headed, or roughly pointed for stabbing. Indeed, so little were they elaborated that many stones naturally fractured would have answered the purpose equally well. We give descriptions of *palæolithic* implements (so called) in a succeeding chapter.

To sum up our notes on Man and the Mastodon, it has to be said that in the childhood of the human race giant animals, suitable for food but now non-existent, were numerous over all parts of the world that investigation has yet reached. Carnivorous beasts, larger than now, warred on them, not sparing man. Enormous and dangerous reptiles infested the shores and freshwater margins, and other strange creatures if not dangerous were irritating. Among these perilous surroundings men, for a time too few to act in concert, had to procure food, for the most part flesh, varied only by spontaneous vegetable productions. During a portion of the early age men lived in caves. When human beings increased in numbers until rock-shelters became too few for all, the great bulk of the race became nomadic.

CHAPTER IV.

DOMESTIC LIFE OF NOMADIC MAN.

Tendency to Migration inherent.—Adoption of Clothing.—Discovery of Fire.—Methods of producing it.—How Migration was conducted.—Dwellings of the Nomads.—Food.—Cookery and Pottery. — Domestic Implements. — War-paint. — Occupations of Leisure. — Amusements. — Early Man as Boat-fisherman. — As Agriculturist.—Belief in a Future State. —These Remarks apply only to the newer Stone Epoch.

THE first individuals of the human race, whether they were created or were bred into existence, would have little disposition to remain in one place. The same feeling of curiosity that we observe in domestic animals when brought into new quarters would more powerfully induce the higher race to extend its knowledge of locality. Not that they at once set forth on definite wanderings with any special object in view. When the original stock had increased in number, small parties would wander afield beyond the usual limits. Man, it must be remembered, is a gregarious animal; consequently the migrations, however partial, would be in parties, not by individual explorers. The one or more persons who wandered off would take with them their women and families, enlarging their numbers in course of time by natural increase on the route. That primeval men must have been con-

tinuously nomadic for a lengthened period is shown by their being found in the west of Europe far from their supposed place of origin. The term primitive or primeval men is of correct application only to the race of the stone age, although those of the bronze and early iron ages are equally prehistoric. In that sense we speak of "primeval men" generally as one continuous race, having throughout its course the same characteristics, although modified by time and surroundings from a rudimentary past until they had so far advanced as to work in iron and to lay out towns.

Besides shelter, the main wants of the race, nomad or stationary, were weapons to procure food and clothing, and, in addition, fire.

Unless we accept unreservedly the belief that the first human being was an adult created with his intellect mature, and possessing an innate knowledge of many subjects—a supposition to which early archæology does not lend confirmation—the mind of an inquirer can but draw inferences from the realistic data before it. Material remains of human handiwork, that a consensus of the most acute thinkers imagines to date back to the very earliest dawn of the race, indicate no possession of innate knowledge, but, on the contrary, a condition of emerging extremely slowly from a most rudimentary beginning. The subject is too august to be superficially treated, and appertains rather to the region of theology and revelation than a cataloguing of prehistoric facts. In accordance with the present state of antiquarian perception, we therefore take as an initial point, that there

was once a time when human beings placed on the earth were ignorant of the element of fire.

Startling as the reflection is, original man had little or no use for fire. It was not necessary to him. He had nothing he wanted to cook, nor to heat, nor to cremate, for he ate his food raw, was ignorant of metals that would bear heat; and if any substance became offensive, he had merely to move away from it. Cold would be his only inducement, and as to that, it is believed that his earliest climate did not call for artificial warmth.

Every-day occurrence shows that the continued friction of combustible substances, such as a wooden wheel on an axle of the same material, produces accidental fire. Certain savages of a low type are known to procure ignition on the same principle by the rapid rotation of a point of hard wood; but the process is laborious and requires skill. Man could not long remain ignorant of the qualities of fire. Substances set on fire by lightning, or dry bark made to smoulder by the friction of boughs, or flame produced by spontaneous combustion, would fall under his observation. He could not imitate these fire-producing causes, but from one quite familiar to him he could readily cause, first, smouldering and then flame. The sole industry in which he ever occupied himself was the chipping of masses of flint into the form of clubs to kill his prey with, and in hammering the edge of flint with a pebble, as like as not metallic, sparks would fly. As the chipping would be done in the open air on some dry spot, a spark would ignite fibres of moss nearly as readily as tinder. The knowledge of how to produce the

smouldering of fire from bringing dry inflammable fibre in contact with sparks from flint (and given a wish for fire), several kinds of withered fungi, called by foresters "punk," could be found on dead trees. Such simple means would at any time produce fire nearly as readily as flint and steel would, and was always at hand. This seems a more feasible method of explaining how fire was produced than by supposing that pointed bars of hard wood and blocks in the inflammable stage of decay could be carried on a journey, or be found at the end of each day's migration, to light a watchfire by friction.

In the more southerly latitudes of Asia mankind would go nude, having no necessity for artificial warmth. As they advanced into shrewder air and more changeable weather, the advantage of some wrap of personal clothing would be evident. The only material of protection within their knowledge would be the skins of animals they had slain. Therefore the use of clothing of skins doubtless preceded the calling in of fire as a means of comfort.

Nomadic movements would at first be by families or in very small numbers of persons. Had migration been in considerable bodies, it could not have been done without some degree of organization and discipline, a point which it takes savages a long time to attain. A migratory family or party making way through a trackless country by land, or along a river course by log-boat, and disposed to rest for a time, would seek the shelter of some perpendicular or overhanging rock. Here a screen of boughs would be leaned against the rock-wall, a fire be kindled to scare the wild beasts that were sure to be near, and

the encampment was complete. If no background of cliff presented itself, a halt would be made in a thicket or beneath some suitable overbranching tree. These rudimentary dwellings, sometimes occupied for so long a time that they yet retain vestiges of man's residence, are known in archæology as "rock-shelters." They were always near a stream, for the reason that the emigrants had no vessels to hold a supply of water. When meant for more than temporary accommodation, they were thatched with a roof. Here the hunters remained while game was plenty, or until some whim prompted them to move on. There, over the fire, when cooking was discovered, the women cooked the flesh brought in. Either the viand was covered with hot ashes until heated through, or if to be boiled, when that more elaborate mode of preparation came in, it was either seethed in water brought to the boiling point in a hollow of the rock by casting in hot stones, or was placed with water in the skin of the animal itself puckered into the shape of a bag, daubed with clay outside, and hung over a fire. From this custom arose the fashioning of crude hand-made jugs of clay, mostly of small size, made as required for temporary use, and but little for preservation, as is shown by the small improvement discoverable in multitudes of existing fragments, until the invention of the potter's lathe in the bronze or it may be iron epoch. Experts in *cuisine* claim that they can tell by the calcination of the bones found in rock-shelters and caves that joints were not roasted by exposure to an open fire, but must have been baked in the manner above described. Here, too, fragments of bones

trampled into the soil have been recovered to show that the animals fed on were of the huge elephant tribe now extinct. To the main diet of flesh it would not be difficult, summer and winter, to add a modicum of vegetable fare in the shape of fruits and herbs, and judging from certain hollowed stones belonging to the later stone age, the crushed seeds of grasses may have served to make a kind of bread. The life of that portion of the race that took up residence in caves could have differed but little from that of the nomads, excepting perhaps in leading a yet more idolent existence.

As the world advanced—through how many centuries it is impossible to say—other articles appeared, specimens of which are among the treasures of antiquarians. Among these were flints toothed like saws and used as such, knives of the same material for cutting, and many articles made of bone and horn by the use of saw and knife. Among these last were long pins and even needles with eye, which let us into the secret that raiment fitted to the person had in course of time come into use, and that cloaks were pinned and garments stitched. Not only so, but shells and bits of shining stone perforated for beads have been found, indicating that ornaments of such simple bravery were worn, probably by both sexes. In the fulness of time stone weapons were polished and bored with socket-holes, and there is reason to believe that dwellings of a more permanent character were clustered in villages. From this point forward the record, if it could be made, would be the annals of clans rather than of the aimless wanderings of savage groups.

There nevertheless remained a sufficiency of savagery and nomadism throughout the whole long period when the more populous parts of Europe were having their flint implements substituted by better articles of bronze, and when an ever enlarging range of ideas was creating new wants.

Early men certainly painted their faces and other exposed parts of their persons, as our British ancestors did theirs with woad; but the custom may not have arisen from any idea of ornamentation. More likely it was as a protection against the clouds of stinging insects that must have filled the air in that time of forests and swamps. In like manner modern anglers and gunners in marshy places anoint their faces and hands with some patent nostrum against the bites of gnats or more venomous mosquitos. From pieces found in caves, red hematite seems to have been the pigment used. An extra coat of this paint would be laid on when going to war, and doubtless would be made to appear as ferocious as possible. From this beginning the custom might easily pass into habitual use.

The occupation of uncivilized man, when not engaged in the activity of hunting, is confined to sleeping and eating or lounging about doing nothing. Having no use for any industrial product, industry is unknown to him. The fashioning of the weapons he needs to procure his food is the only work he ever puts his hand to; and the number of those required for his personal use are so few that he does not set about their manufacture as a settled task, but does a little occasionally in an indolent way.

No improvement in their shape, material, or principle seems to occur to him. At the same time it is curious that the imitative faculties of early men should have stopped short at imitation as soon as a reasonably serviceable model was found, and that the weapons and implements of both worlds, European and American, as well as the few that represent our acquaintance with Asia, are almost identical in pattern and make. This fact, although an obscure proof, is still a proof of man's gregariousness and nomadic habits. There must have been continued intercommunication between bodies of the race, firstly, to arrive at the universal model, and, secondly, to retain it. A uniformity of appliances could by no possibility have been a coincidence of chance. Men were therefore nomadic and in intercommunication.

The respective occupations of the sexes seem to have arranged themselves from the beginning. Although the women of savages are as familiar with weapons as the men are, as has been apparent in many collisions with wild tribes, the more muscular exertions of the chase were left to men. Beyond that employment the stronger sex declined all physical strain. Where fires were used, the gathering and carrying of fagots was women's work. Cookery naturally fell to her share, and not only the act of cooking, but the making of pots to cook in. When garments were adopted, the women scraped and tanned the skins and, perhaps, fashioned and sewed them. When the camp of huts was struck, women, as creatures of burden, carried the baggage, chiefly bundles of skins, for they had no household utensils.

Leading a life of indolent torpor of muscle and mind, alternating with every physical and perceptive faculty on the strain, there seems no place for what may be called amusement; but to reason that they had none would be an error. Man, it must be remembered, is gregarious, and the young of all animals, companionable or not, are full of playfulness. There could never be a total absence of amusement where children were. The writer has had acquaintance with parties of a North American tribe, once warlike, and even yet partly nomadic, and he has been interested in observing the stern-faced men lying about at the openings of their bark "wigwams," gravely watching, with occasional grunts of amusement, the gambols of the sprawling infants, or the young boys practising with bows and arrows, while the low and particularly soft laugh of the "squaws" testified delight. So true it is that human nature is the same in all ages from savagery to civilization. There seems further to exist in all men, as an offshoot from the innate quality of curiosity, a liking for games of chance, as is exemplified in lazzaroni basking in the sun and interminably playing the seemingly uninteresting game of *moro*. We may assume that early savages had this resource in common with modern. To quieter amusement would certainly be added the emulation that springs from fine physical condition, as in feats of strength or address, and that would, no doubt, often end in strife and bloodshed. No traces of amusements remain from early times, excepting that of later date certain flat stones, artificially rounded, are supposed to have been used as quoits. No

relics whatever of religious observance have come down from the stone age. Evidence exists of funereal feasts near places of burial, and in such places, even of the most antiquity, votive offerings were almost always placed with the dead. Faint traces have been noticed of cannibalism, but so few that they may be attributed to local and temporary pressure of famine, and not to custom.

Were early men fishermen? and did they grow any product of the soil? Various relics provide an answer to both questions. It was not until implements made of bone became common that we find specimens of fish-hooks and fish-spears made of that material; and not until near the close of the stone age that curved implements of flint appear, supposed by some to have been sickles for reaping grain, although the crop may as likely have been seeded grasses and water-plants. Fishing-hooks and harpoons imply boats and cordage; and primitive boats have been found sunken in Swiss lakes and elsewhere, but these date from much later than man's first appearance. Early men, whose physical powers were necessarily cultivated to the utmost, were, without doubt, able to swim across any stream of moderate width, or, for wider waterways, could readily construct rafts. Heavy boats, hollowed from logs, indicate permanency of residence near water, as they would only be an incumbrance to migratory parties, inasmuch as they could not be drawn overland from stream to stream (*portage*, so called). And any attempt at agriculture presupposes, even more than the construction of boats, a permanency of occupation. In slow process of time the race advanced to boat-building

and the cultivation of the soil, but not until the wandering elements had consolidated and laid the foundations of tribes. Earliest hunters pursued their game without the aid of dogs, and the domestication of field animals and horses was not accomplished until the bronze age.

We have as yet said nothing as to the disposal of the dead by primeval man. There can be no doubt that it took time before burial of any kind became the custom. Naked savages of the early palæolithic era would leave the dead where they fell, and the survivors would move on. Decent disposal of the deceased itself marked a considerable step in progress. When it had been generally adopted, funeral customs varied in formalities, but, curiously enough, through all time ran the belief that the dead lived again somewhere afar off, and articles necessary for a journey were placed with the bodies for use on the way to that other land. On this fact many psychic hypotheses have been built.

CHAPTER V.

THE OLDER STONE AGE.

PALÆOLITHIC.

Weapons ponderous in this Age.—The River Drift.—Theory of Currents.—How Man's Handiwork is found in Drift.—Human Remains necessarily rare.—Vast Antiquity assigned to Drift Relics.—Where earliest Man lived.—London once a Swamp.—Flint Clubs.—Spears.—Palæolithic Discoveries in France.—In England.—The Age of ponderous Flint Clubs dies out.

REASONING from analogy, one would naturally suppose that the weapons of attack used by earliest man were heavier and more formidable when he had to contend with mastodon and mammoth, cave-bear and lion, than when he had but to strike down the ox tribe and reindeer. Accordingly we find a marked difference in the make of flint fashioned as arms in the very earliest and a later period of earliest time. Recognising this evident difference in make and intention, the lithic period naturally subdivides itself into the *palæolithic* and *neolithic*, Older and Newer Stone Age. It is the so-called Older Age that we now contemplate.

Confusion has sometimes arisen with respect to fossil remains from the loose use of the word "drift." Until

of recent years the Noachian deluge was considered sufficient to explain the phenomena of the diluvial drift. Since that opinion partially slipped out of general belief, geology has not offered an explanation that is wholly explanatory why an era of moderate temperature should be exchanged for one of glacial frigidity succeeded by a return to a condition not widely differing from that which had previously obtained, yet the indubitable testimony of the rocks bears witness that enormous rocky masses grinding upon the bed on which a glacial sea was flowing—perhaps rushing—to the southward ground themselves and the strata they passed over into viscid mud, which was left as moraines when the irruption of ice thawed and retreated. Geognosts infer that these changes were caused by upheaval of the earth's surface in the north circumpolar region or by depression elsewhere, which latter explanation poets connect in fancy with the subsidence of the supposed submerged continent of Atlantis.

The term Fresh-water drift, or River-gravel period, describes accurately that unknown stretch of time when the rivers were excavating the valleys and superimposing the materials they brought down on the underlying strata. Relics of the earliest race of men with which we are as yet acquainted are found in this fresh-water or river-gravel deposit.

The force of a descending current of water overflowing a permeable soil may be fairly calculated, due allowance being made for the volume and the torrential nature, much or little, of the flow. With a flow of 300 yards

per hour the water would be merely rendered turbid by the suspension of fine clay; of 600 yards, would bring down sand; 1,200 yards, fine gravel; and if over two miles an hour, the tide would carry down, it might be to long distances, angular shingle stones as large as eggs, and would wear the edges off them, together with any articles of inconsiderable specific weight caught on the bank in the overflow. Where sinuosities of channel checked the flow, or where eddies occurred, the drift that was being borne onwards would subside, while the lighter earthy particles would be carried away to form an alluvial deposit farther down stream when the waters should fall. Repeated overflows might again catch up the gravel where deposited by the first flood and convey it yet farther, until checked by some permanent obstacle, or until the deepening of the channel, or perhaps a change of course in the waterway, should leave the drift high and dry. All evidence points to the certainty that men then lived in the valleys, following the course of streams margined by meadows on which the large graminivoræ pastured. In sudden inundations dead bodies of men or other animals overtaken by the flood would be carried onward to the sea or be cast ashore and would decay, while indestructible flint implements swept from lodges on the banks would be caught in the river gravels, and after vast periods of time give indisputable evidence, as they have done within the past few years, of the existence of man in the most remote antiquity. For no flood could bring down stones, wrought or unwrought, that did not exist within the area of

drainage; and if bones of animals of great size, now extinct, are found embedded with the handiwork of man, no further proof is required that such animals likewise existed within the same drainage area at the time when inundation carried man's implements away.

The circumstance that few human remains are found in the gravel deposits, although bones of the larger extinct animals are not uncommon, has not escaped notice. Several suppositions have been advanced to account for the absence of the bones of man, although the presence of these would afford no more proof of his co-existence than are his handiworks. There does not appear difficulty in the explanation. Inundations certainly rose with rapidity and force, otherwise they would not have swept away the gravel of the banks with man's magazine of flints, and no doubt his other possessions, if he had any; but in all probability chance means of escape from the flood were available to himself that would not suit heavy wild animals. Allowing that some human beings were drowned in these floods, as no doubt they were, their lighter bodies would be carried downwards to the sea, and would not ground in the shallows as the bulky and ponderous corpse of a mastodon, for instance, would. A distinguished antiquary has pointed out in this connection, that, so far as yet searched, the relic-bearing gravel beds contain the remains of no animal so small as man.

The question here arises, *When* were these implements of flint, the evident handiwork of man, deposited in the gravel-drift in which they are found? So great a lapse

of ages is involved in the reply, that the mind, accustomed to reckon the affairs of men by brief chronological periods, hesitates, for the era of deposit goes back to a time when Britain was part of the Continent and the German Ocean did not exist as a sea. A pluvial period had succeeded the glacial, the face of the earth was rounder, therefore the rivers ran at higher levels, subject to sudden floods that overflowed their channels and gradually ate out the wide hollows of the valleys. How slowly this excavation was done has been estimated in various ingenious calculations made from observation of known rivers. The Thames, it has been carefully estimated, lowers its basin at the rate of about one foot in 11,700 years, and other great rivers in different parts of the world accomplish a similar depression in periods varying from 1,800 to 9,000 years. One able calculator, Mr. A. Tylor, estimates the excavation of most of our English valleys at one twelve hundredth part of a foot per annum, or one foot in 1,200 years. This has led Sir John Lubbock to accept 200,000 years as an approximation to the time when the rivers, fed by abnormal rains, began to hollow out the valleys of our existing streams and of others now absorbed. It requires an effort to grasp calculations so stupendous. Let us modestly suggest that, for all that is known to the contrary, the phenomena might eventuate in a much shorter space of time. Even were it so, or not so, it would not in either case affect the facts of the surmised history of prehistoric man.

However fanciful these remote chronological eras may

appear to some minds, the palæolithic relics of man deposited in the erosion of the water-sheds demonstrate beyond a doubt that human beings were in existence and manufactured implements of flint at a time so hugely remote from the earliest dawn of history, or even of tradition, as to leave room for the passage of the following periods of time, each of long duration; namely: (1) the time necessary for the excavation of valleys to nearly their present depth; (2) for the dying out of the giant mammals that were contemporaneous with man, and for the coming in of a new fauna; (3) the period of the New Stone or neolithic age, in which implements of stone advanced from being roughly chipped, through the stages of being ground, polished, and perforated; (4) the bronze age, in which skilfully formed implements of hammered and smelted metal exhibited the earlier stage of art; (5) the prehistoric iron age, in which dawned the first glimmering of civilization; and (6) the modern era, of which art and letters have preserved the records. Even estimated by the probable continuance of these successive periods, the date of the palæolithic age is of vast remoteness.

It may seem far-fetched to picture the social state of remotest man with no data to judge from but a few masses of rudely chipped flint. These, however, tell their story plainly enough. All the flint implements that tell of man's existence have been preserved by the overflow of water-courses in valleys, therefore the earliest race of men lived in valleys. The abnormal size of these implements of the chase indicate that the prey was large. We

know that graminivoræ, large and small, stray slowly along in herds, grazing wherever the pastures are attractive, as would naturally be the case along river margins. A single hunter with a stone club, such as these relics show he was armed with, would find himself powerless in attacking a herd of giant animals, from which fact it is legitimate to infer that a number of men acted in concert in the chase. The clumsy form and weight of their weapons, not at all suitable for rapid use, lends colour to the supposition that stratagem had as much to do as courage in hunting; for, however serviceable the ghastly spears might be in slaughtering a trapped animal, they would be little efficacious in single combat with enraged elephants. With such game there would be no necessity for the two-ounce arrows of a later period, and in consequence no dressed flints small enough for projectiles have been extracted from the drift.

A few flints, roughly lanceolate-shaped, lighter than the heavy spears of attack, have been found, that may have been darted from the hand with or without a thong attached, and would rather indicate strife between men and men than hunting of game. When population had increased to considerable numbers, no doubt these darts (javelins) added another proof to the axiom that "war is the normal condition of man." Constantly following on the track of the elephantine creatures that were his main food (for man must then have been almost wholly carnivorous), he must have made himself in a manner nomadic—a fact supported by the shape of his weapons not being adapted for cleavage, inasmuch as they had no

cutting-edge such as the "celts," or stone axes of later years had, leaving room for a fair inference that men's habitations in earliest time were not put together by *building*, but continued to be mere "rock shelters," or boughs of trees leaned against the face of a cliff. It may be mentioned that no trace of fire has been detected on any of the drift relics, but it cannot be argued from

FIG. 3. Smallest drift flint, 4 inches in length.

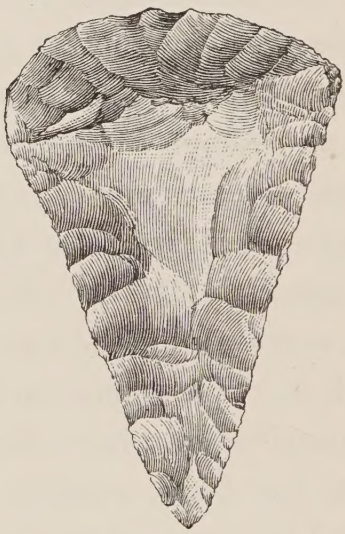


FIG. 4. Large neolithic arrow-head, $1\frac{7}{8}$ inch in length.

absence of fire-mark on these water-worn stones that fire was not used in preparing food.

A race habitually dwelling on the edge of running rivers that were liable to floods could not remain ignorant of the floating properties of wood, but from the necessity of following their game from one side of a stream to the other, the human beings of the time would certainly be expert swimmers. Being so, in their nomad life of short journeyings after the game they pursued they would

have little necessity for boats. They could therefore have had small object in "taking to the water" beyond spearing fish on the shallows, an art of which no record comes down to us from the purely drift period, but does unmistakably from the cave-dwellers. So few years have elapsed since prehistoric archæology opened itself to research that we have barely had time to classify and critically compare the scraps of evidence we are in possession of. Such, however, as we have show that the features of primeval man are not widely different from what we have above divined: a race with no softening influence or educating force beyond the out-door observation and sharpened cunning of the savage, and without the modifying power that the communion of considerable bodies of their kind exerts. It is no subject of wonder, then, that there appears to have been one dead torpor of intellect in which human intelligence did not advance during the whole time that the palæolithic vestiges represent. Even the differences in manual execution in different specimens is only of degree, not in design, and seems to have been individual, not general.

The earliest wrought flint implement known to have been found anywhere is a large club exhumed with an elephant's tooth towards the close of the last century, in excavating near Gray's Inn Lane, and now in the British Museum. In form and dimensions it closely resembles the dressed flints from Acheul in France. This relic suffices to show that man and the mastodon were at Gray's Inn long antecedent to the founding of the Roman town of Londinum-in-the-marsh. Another

similar club of six inches in length was recently obtained from the Suffolk side of the Little Ouse, almost identical with the Gray's Inn specimen, showing that both weight and form were recognised as suitable for use, and that the resemblance was not fortuitous. The Gray's Inn

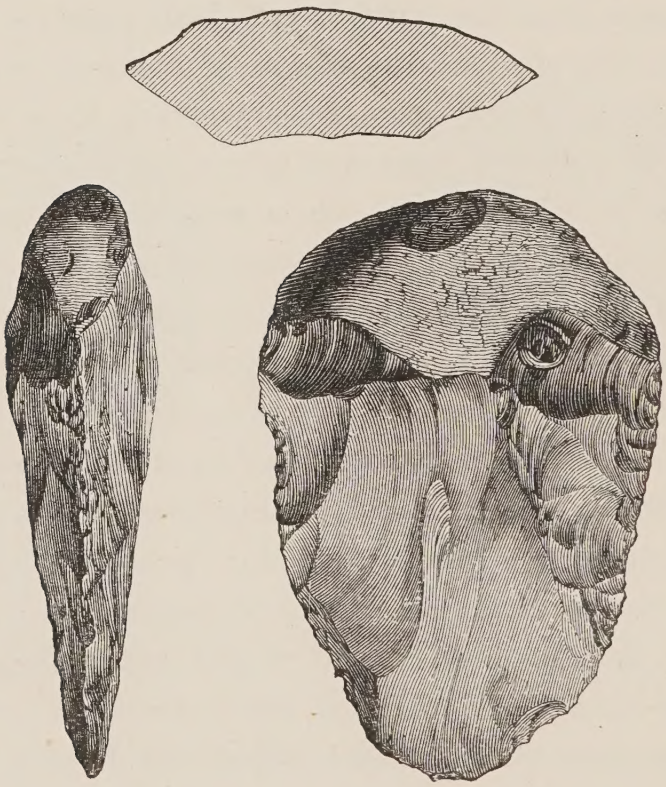


Fig. 5. Typical flint spear, 7 × 4 inches, weight about 1 lb.

specimen had passed out of remembrance, when it was recalled by interesting discoveries in France. A French observer drew attention to certain pieces of worked flint that had been observed in so-called diluvial drift near Abbeville. Eight years later another scientist described

specimens embedded in a similar matrix near Amiens. The discoveries did not meet with the attention they deserved, until within a very few years past the inquiries of English archæologists were directed to the alleged deposits, with the result that the authenticity and great antiquity of the specimens have been fully established. Numerous finds of the same type have followed both in France and England, in gravel, sand, and clay, for the most part on the slopes of existing river depressions. One of the most prolific localities hitherto found is in the valley of the Ouse, near Bedford, where in a gravel bank thirteen feet in thickness remains of elephant, hippopotamus, rhinoceros, urus, ox, hyena, and other animals are found, together with chipped flint implements of large size and rude form, indicating the presence of earliest man in that valley. Characteristic types of the weapons of the period are here given. Fig. 5 is an average specimen of the flint club, which was probably inserted in a cleft stick, straight, or more likely angularly.

Herne Bay is a fruitful field of research, more than a hundred genuine specimens having been found there within a few years. Analogous forms of the types found in Britain have been obtained from the gravels of France, showing that at the time when these weapons were lost primeval man was the same in what is now Britain and on the Continent. The specimen here figured was obtained from Herne Bay, and, as may be seen, is adapted only to the striking of bruising blows, no doubt inflicted by the full muscular force of both hands. Spears (fig. 6) were doubtless operated in like manner by being

pushed with bihanded force. Ribs of the mastodon have been found scarred with stabs from such spears. In

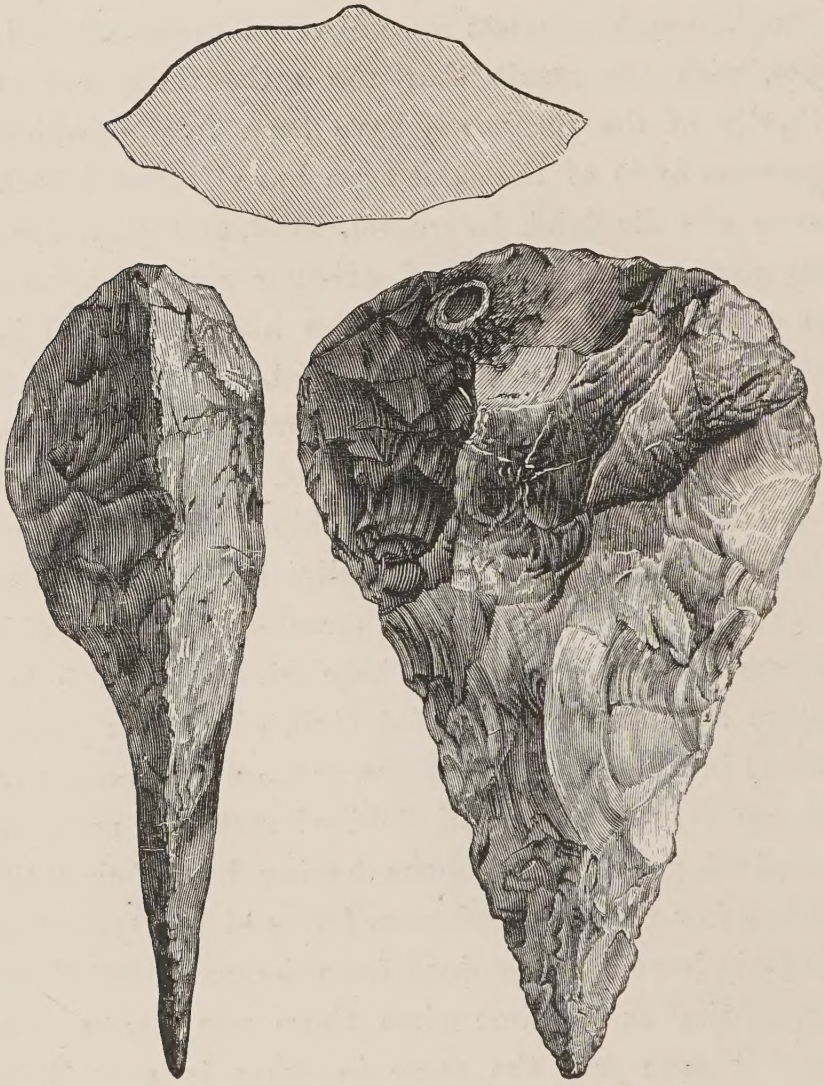


Fig. 6. Spear of Older Stone Age, $7 \times 3\frac{1}{2}$ inches.

addition to shafted weapons a formidable arm (fig. 7), jointly club and spear, is not uncommon, in which a large nodule of flint has been sharpened into a stabbing

FIG. 7. Hand club, 7 × 10 inches.

tool, but with the crust of the pebble left to be held in the hand. The blows given by such a weapon would be severe.

Ardour sometimes misleads into the belief that one has found an implement of antiquity when such is not the case. This has occurred in the article of sling-stones and pebble-hammers, it being so difficult to select from a bed of water-worn stones such as may have been used for either purpose. Indeed, it is not always easy to decide at first glance whether some angular mass of flint has really been an antique club, or merely a stone accidentally fractured in that shape. Nevertheless, pebbles must certainly have been used as hammers in the chipping of flint; and the strong probability is, that slings for casting stones were known. As, however, any flat stone up to three inches in length would do for a projectile, it is little likely that chipped flints, such as may be occasionally seen in museums, labelled "sling stones," were specially chipped for that purpose.

It will be observed from the figures engraved in this and the chapter on Celts that the weapons of the Older Stone Age are all round-backed or spear-pointed for bruising or stabbing, while those of the sub-period that goes by the name of the Newer Age are of axe-shape, adapted to cutting or cleaving. This fact alone typifies a great advance in the requirements of every-day life. The number of uses to which a cutting tool can be put are many, and each requirement indicates an additional want and a further expansion of intelligence.

Limited as the wants of men of the river drift must

have been, they could not have been wholly without some kind of what may be called domestic implements. Edged flints for skinning carcases, flint knives, borers, and other rude tools of the Later Stone Age have been found in great numbers. The older race, no doubt, had the same requirements that these were intended to fill; but such small articles, being brittle, could scarcely be found unbroken in the layers of stones brought down by torrents. In absence of flints for scraping and dressing skin, we are open to infer that human beings of the time had no other clothing than wraps of hide.

There is perceivable a link amissing in the gradation of man's development between the Older and Newer Stone Age, but which further discoveries may supply. At present it is imperfectly outlined in the history of the Cave-dwellers.

CHAPTER VI.

CAVE-DWELLERS.

Britain.

Cave Population not large.—Probably fluctuating.—Classification of relic-bearing Caves.—Reading of the Caves.—Mammoth Remains therein.—Dog and domesticated Animals, Date of.—Kent's, Brixham, Bacon's Hole, and other British Caves.—The Relics found therein analogous to those of the River Drift.

In pursuing our subject over the unknown length of time during which at least a portion of the then existent human race made their habitations in hollows of the rocks, it may be well to guard against the misconception that is apt to arise from using the expression "the Cave-dwellers" vaguely. That term is in itself preferable to the word "Troglodytes," which carries a savour of classic myth with it. The loose use of either appellation might convey the impression that all the race of remote antiquity had their dwellings in the rocks. This would not only have been impossible in point of space, but is at variance with what is accepted as sufficient evidence to the contrary. Limestone or other caverns were limited in number and dimensions—some of them being mere clefts. That many caves were occupied as headquarters by successive bodies of men is proved beyond controversy;

but in speaking of the cave-dwellers and the vestiges of their residences, we must bear in mind that almost no given cave would contain at its fullest habitable capacity more than a score or two of people, or the population of a small village. At the same time even these few have left us sufficient evidence as to what was their manner of life. When cramped for room, the caves would give off swarms, the records of which would be lost. Information given by caves once inhabited is therefore that of the family, or at most of small clans, not necessarily identical in all respects with the bulk of a people. Thus there always existed two concurrent branches of population; namely, the tenants in caves and the dwellers in the open. The relics of the latter, scattered over the surface of the earth in the course of their nomadic life, offer us no continuous story, while from the memoranda left us we can reproduce cave-life with sufficient accuracy. The reading of the caves is indeed so clear that it leaves no room for error of much importance. Its weakest point is in assuming too readily that the same individuals and their descendants continued to live for long stretches of years in the same caves, overlooking the much more likely probability that these convenient refuges had successions of tenants. It is quite certain that if a cave suited the men of the valley, they would occupy it as a centre for their pursuit of game, and when such ceased to be the case would abandon it, the same cave being liable to be again lodged in by the same or other persons, each occupancy leaving traces after intervals of we know not how many

years. The fact of such successive wayfarings would render easy of explanation the slight variations noticeable in the relics from adjacent caves, and makes it safe to regard the measure of intelligence shown by the cave-dwellers as that of the general race of the period.

Ossiferous or relic-bearing caves, chambered or sinuous, are found in various places of both hemispheres, being mostly natural hollows in rocks of calcareous formation, especially oolitic limestone; hence with reference to archæology that rock is spoken of as "cavern limestone." Not all ossiferous caves contain relics of man and other animals in like relations. Some rock clefts have been no more than dens of wild beasts, such as hyenas, bears, and cave-lions, and are now found to be floored with fragments of gnawed bones, but none of man. Others have given up pieces of human bones, generally few in number, commingled with other gnawed remains, from which it is not to be inferred that man lived in that cave, but that he had fallen a victim to its ferocious tenant. Next, the large number of caves that have served as the habitations of hunters who have left behind them remains of existing and extinct animals of the chase, but no human remains, it being natural to suppose that the residents would remove their dead from the presence of the living. Lastly, some few caves have been unearthed wherein the dead were specially deposited.

Indestructible specimens of man's handiwork have been found abundantly in caves. These relics range from roughly chipped stone clubs up to artistically fashioned implements of metal, thus showing the vast

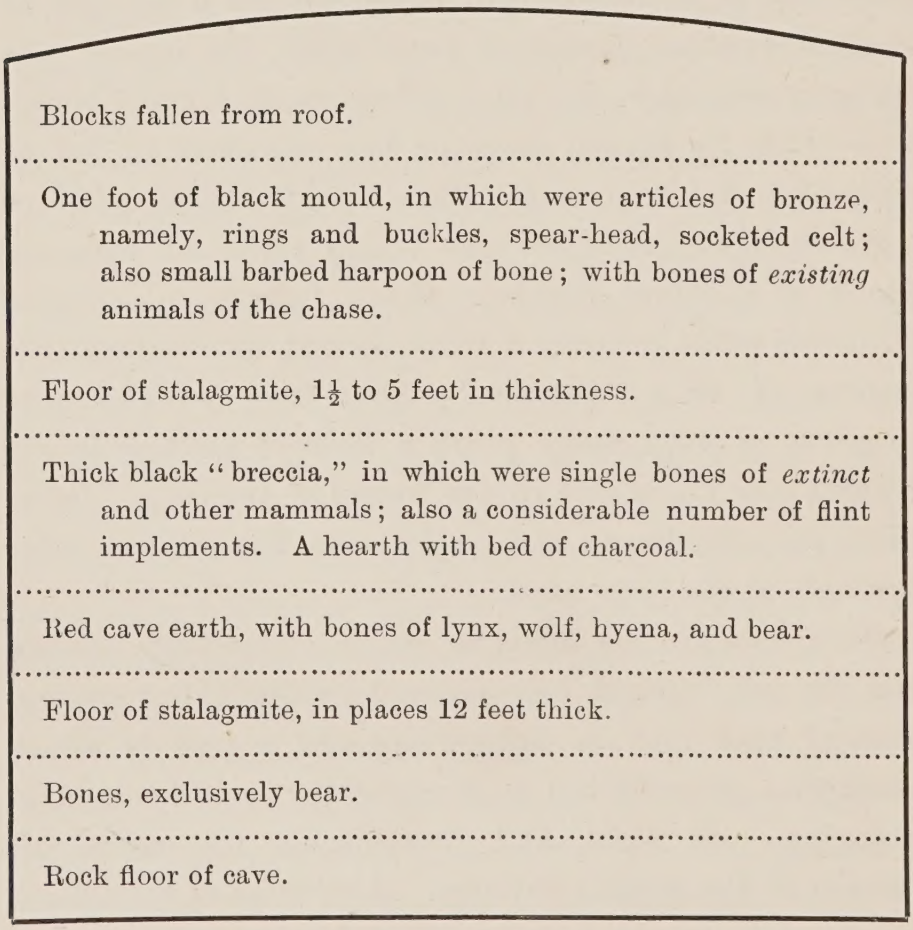
stretch of time during which caverns were occupied, either periodically or continuously, as human habitations.

Whether some of the rock hollows were packed with the matter they contain by the action of water flooding or percolating through them is a matter of detail affecting individual caverns. Sometimes on the original horizontal or sloping floor of limestone lies a stratum of washed pebbles deposited there while the cavern was being excavated by the joint influences of air and water. Over this lie layers, more or less stratified, of red or yellowish soil known as "bone earth," "relic bed," or "archæological stratum," in which relics of man are found at different depths. When lime is commingled with this earth, it forms a hard cement, or conglomerate, spoken of as a "breccia." Sometimes in the slow progress of very many years a floor of stalagmite has formed over and shuts in the record of the cave. Generally the relic-bones and implements lie without order throughout the bone earth.

Such then are the fields in which archæology labours, and the self-imposed fatigues and indomitable perseverance of such men as Schmerling and a host of others teach that physical toil is as necessary as enthusiasm in dragging into light and deciphering the ethnologic records of the world's infancy. Acuteness of perception, tempered by cautiousness of judgment, may serve for what we may call the *reading of caves* that have been laid bare.

Archæology is fortunate in certain relic-bearing caves in Britain having been exhaustively examined by com-

petent authorities. Among those best known is Kent's cavern near Torquay, others at Kirkdale, Yorkshire, in Glamorganshire, and elsewhere. Kent's was discovered as long ago as 1824, but has only recently been systematically investigated. An idea of its contents may be gathered from the following diagram:—


Blocks fallen from roof.
One foot of black mould, in which were articles of bronze, namely, rings and buckles, spear-head, socketed celt; also small barbed harpoon of bone; with bones of *existing* animals of the chase.
Floor of stalagmite, 1½ to 5 feet in thickness.
Thick black "breccia," in which were single bones of *extinct* and other mammals; also a considerable number of flint implements. A hearth with bed of charcoal.
Red cave earth, with bones of lynx, wolf, hyena, and bear.
Floor of stalagmite, in places 12 feet thick.
Bones, exclusively bear.
Rock floor of cave.

The reading is, that the cave was at first a bear's den—abandoned for so many ages that a stalagmite floor formed—again taken possession of by wild beasts—again abandoned by them—occupied by man of the palæo-

lithic era cotemporary with large animals now extinct—abandoned by man for many centuries, during which a second floor of stalagmite formed—temporarily lived in by men acquainted with the use of metals, and who were employed in hunting animals of the chase such as now exist, the mammoth mammalia having become extinct. Following the generally accepted estimate of the duration of the newer stone age, at least 2,000 to 4,000 years must have elapsed between the first and second residence of men in Kent's cave.

FIG. 8. Edged disc, $3 \times 2\frac{1}{4}$ inches.

The flint implements in the breccia beneath the upper floor of stalagmite are mostly tongue-shaped, or ovoid, resembling those found at Abbeville in France. A useful tool in the shape of a flat ovoid disc of flint, $4\frac{1}{2}$ inches by 3, with a cutting edge all round, was here found. It might have been used for scraping or cutting out skins. Another of a similar construction, 3 inches in

FIG. 9. Barbed bone.

length (fig. 8), may have been used for the same purpose, it being too slight for either spear or projectile. Numer-

ous flakes and splinters worn at the edge by use were found, also hammer-pebbles and pieces of sandstone for whetting were among the *débris*. A bone implement, reproduced of full size in fig. 9, and described as a "harpoon," can scarcely be accepted as a proof of boat-fishing in absence of any marine vestiges in the stratum in which it was found, although sea-shells are abundant in the upper, or later, deposit of the bronze era in the same cave. The tines being parallel, so that a slight pull would extract them, and the whole weapon being too weak to hold a large fish, it was probably a hand-spear for spearing frogs. Pins and needles of bone, designed of full size in fig. 10, show that the human beings of the time had arrived at the fashioning of garments.

It requires some effort of fancy to fully grasp the fact that when savage men, clad in skins pinned with bone skewers, took temporary shelter in Kent's cave, England was inhabited by weird creatures larger than any that now walk the earth. Woolly elephants wandered in herds over the pastures of Devon. On the pleasant slopes around Torquay the rhinoceros stalked, troops of wild horses and bisons galloped along the valleys, the gigantic elk and reindeer supplied prey for lions, bears, hyenas, and wolves, not excepting the most formidable of the feline race, the sabre-toothed tiger. Complete skeletons of none of these old-world animals have yet been discovered in British caves, but disjointed bones of all those named were embedded below the stalagmite floor in Kent's cavern, associated with implements fash-

ioned and used by man. The hippopotamus, of all the huge quadrupeds of the time, was alone amissing. The superincumbent floor of encrusted lime has handed the osseous remains down to us in complete preservation, and recognisable beyond room for doubt.

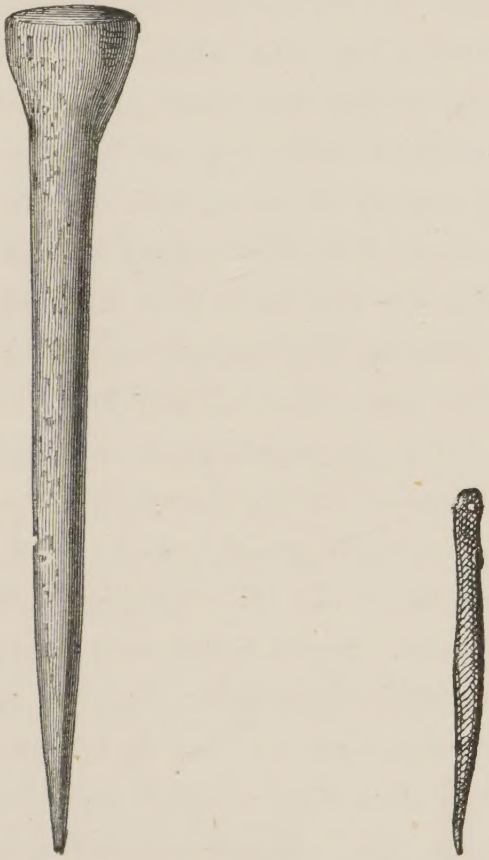


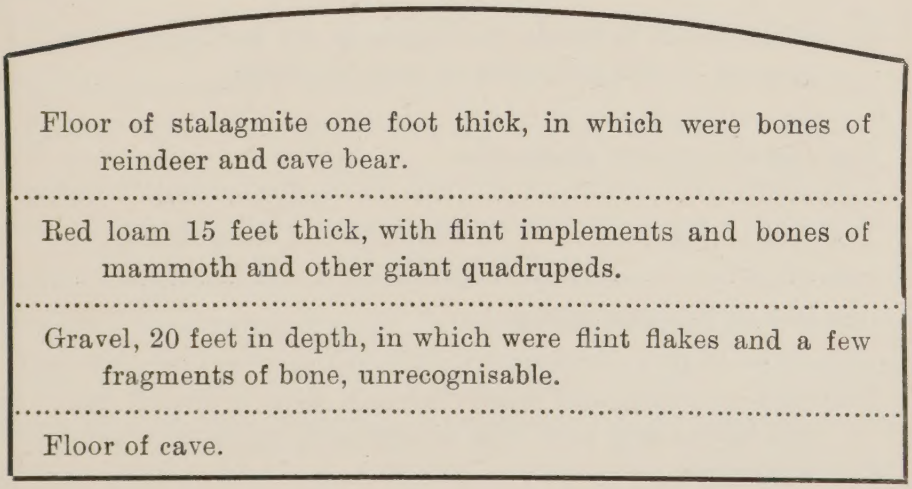
Fig. 10. Pin and needle of bone.

An interesting feature of Kent's is that two distinct eras in man's history are brought before us in contrast. The earlier sojourners in the cave were associated—as has been said—with the giant mammals that had become extinct before a second colony of human beings came to occupy the cave at a level above the buried relics of the

first dwellers. The second incomers are associated, not with gigantic remains, but with bones of a lesser fauna, such as exists at the present day, but not any domesticated animals, such as the ox or dog. Here we have an indication that the date when the dog became the friend of British man, and *his assistant in hunting*, was not until after the bronze age was some time advanced. The weapons with which the later party slaughtered this lesser game were of metal, a great improvement over the former heavy masses of stone, and therefore rendering it easier to procure a steady supply of food. This easy supply, joined to the fact that abundance invariably induces indolence in the savage, rendering the exertions of nomadic life less welcome, may have been an inducement for a party to protract its stay under the roof of rock; but persistent living in caves from generation to generation lacks much proof before it can be accepted as the normal mode of life of anything beyond wandering parties of the race. Septs of different habits, and perhaps of different speech, would have evolved during the long period of the stone age, so that it by no means follows that any given cave was occupied continuously even by the same family type. Hunters at different dates might make it their quarters for a time, deserting it when game ran short or for other reason, and again returning to it when circumstances changed. Among many able and ingenious archæological essays, we have not met with any attempt to estimate *for how long* any one cave was inhabited, or by what number of people, and yet this might be vaguely shadowed by approximating the quan-

tity of *débris*—remembering that refuse was not thrown day by day as into a pit, but gradually accumulated from droppings, which might have been those of one continuous family, or a succession of parties at intervals. Cave life, in its semi-obscurity, offered little to excite the inventive faculties. From this reason it may be, that British cave-dwellers have left nothing behind them that leads to suppose they had developed any ornamentative or constructive powers, in which respect they were behind some of their congeners in France. On this subject see some remarks in our chapter on Art.

In 1858 an ossiferous cave at Brixham, near Torquay, was discovered by part of the roof having fallen in. The reading of this cave is as follows:—


Floor of stalagmite one foot thick, in which were bones of reindeer and cave bear.
Red loam 15 feet thick, with flint implements and bones of mammoth and other giant quadrupeds.
Gravel, 20 feet in depth, in which were flint flakes and a few fragments of bone, unrecognisable.
Floor of cave.

The wrought flints found in this cave (says Mr. John Evans, F.A.S., the best authority on palæolithic relics,) are identical with those found in other caves where the implements are analogous to those of the ancient river gravels.

Several other caverns associated with the longer or shorter sojourn of uncivilized men who have left traces that we can recognise and reason from, have been investigated in other parts of Britain. In Hyena Den, so called, near Wells, rudely fashioned spear-heads closely resembling those of the river drift, but of smaller size, have been found, along with a fauna similar to Kent's. Near Tenby, in Pembrokeshire, other flint and mammoth-bearing caves have been examined. Bacon's Hole, a cave in Glamorganshire, explored by Dr. Falconer, and by him reported to the Geological Society, exhibits a section not much dissimilar from Kent's :—

Superficial earth, in which were bones of ox, horse, and deer, also wolf; with fragments of British pottery.
One foot of irregular stalagmite.
Two feet of limestone rubbish, with bones of bear, also ox.
One foot of irregular stalagmite.
Two feet of earthy and sandy rubbish, with bones of bear, also hyena and wolf, and of elephant, rhinoceros, bison, and deer.
A thin layer of stalagmite.
Limestone floor of cave, covered with a few inches of marine sand.

In reading this cave it will be observed that, like Kent's cavern, it is divided by distinct floors of stalagmite, and could only have been occupied in the times between the formation of these divisions, and that unmistakable vestiges of man's residence are only found on the most recent plane above the upper floor. The cave was originally a den of wild beasts cotemporary with the mammoth grass-eating animals, and, finally, at a late period of the stone age, near the Roman, visited by man, probably for a short time only, the bones found being those of animals of the chase, of types now existing and that are usually hunted in the open field. The fragments of domestic pottery would indicate at once a migratory party and the presence of women. No human osseous remains.

Several other cave explorations in various parts of the kingdom have offered confirmation that man at different stages of the stone age, even up to the time he began to be acquainted with working in copper, has made temporary sojourn in caves, especially during the period when the giant mammalia were his prey. The type of articles generally found in relic-bearing caves brings their study within the palæolithic period. Professor Rau, of the Smithsonian Institution, Washington, U.S., in his "Early Man in Europe," thus accurately sums up a chapter on British caves: "Generally speaking, the fauna of the caves is analogous to that of the river drift, and the same peculiarities characterize the drift implements, and those occurring, commingled with osseous remains, in the mud of caves. The bone and tool-bearing

strata of the drift and the older cave deposits may therefore be assumed to belong to one period, provided that this term is taken in its broadest and most expanded sense."

CHAPTER VII.

CAVE-DWELLERS (*continued*).

COUNTRIES OTHER THAN BRITAIN.

Cave Explorations in North and South of France.—Valley of the Somme.—On the Dordogne.—Classification of the Dordogne Caves.—The Reading of these Caves.—Germany, Switzerland, Poland.—In Belgium.—Other Countries.—In all these Man, Mammoths, and Reindeer. — Types of Weapons. — And the Weapons were Palæolithic.—Explorations in North America.—In the Tropics.—Summary.

GREATER scope exists for the study of caves on the continent of Europe than in Britain. Within the half-century or so that has elapsed since early archæology first attracted the attention of scientific men, ossiferous caves of great interest have been explored with care in France, Belgium, Germany, Poland, and other countries, besides in Britain and America, and the results of research have been compared with the surface relics that tell of a later or neolithic age. The sum of all investigation has been to disclose a similarity in the products of caves all over Europe, showing habits of life more rugged in the cave-dwellers than were afterwards exhibited by dwellers in the open air. In course of the changes on the earth's surface that substituted a newer fauna for the older

mammalia, the handiworks of man, made in imperishable stone, showed little modification in shape or use, until by a sudden leap is presented the more skilful workmanship of the Newer Stone.

Two districts, one in the north and the other in the south of France, offer rich archæological ground. That in the north is the valley of the river Somme, fertile in orchards, meadows, and corn lands. Many wrought flints have been found in the drift-beds. These are in general very rudimentary, being almost identical with those obtained from the earliest river-gravels, and of two forms, the first resembling rude spear-heads, the other almond-shaped and sharpened all round. These last are known as "hatchets" (from *hachette*, a little axe)—a misnomer, for they are little adapted to use as axes. They may, however, have been used as chopping implements if fastened in a cleft handle. The lanceolate form is more common near Amiens, especially at St. Acheul; the disc-shaped near Abbeville.

In 1859 discoveries by Mons. Boucher de Perthes attracted the attention of English antiquarians to a locality of even greater interest in the valley of the Vézère, an affluent of the Dordogne flowing through the vineyards and nutfields of the land dear to mediæval poetry and romance as the Province of Aquitaine. These caves were jointly explored by M. Edouard Lartet and Mr. Henry Christy, both of whom died before their labours were fully appreciated. These caves, as well as many similar in Belgium and elsewhere, contain little beyond the bones of animals that had served for human food, with lost

and waste tools and utensils. Nevertheless, there is considerable variety in the relics taken from the respective pits.

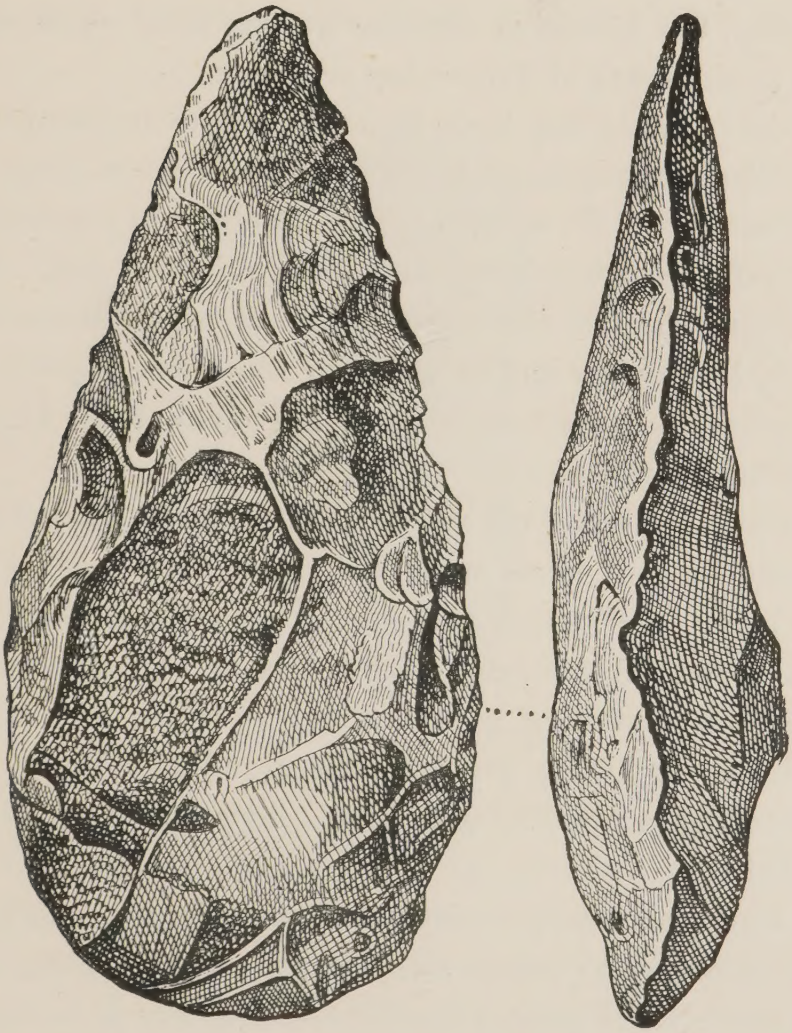


Fig. 11. Section of hatchet, ½ size, St. Acheul, Amiens.

Some French archæologists have devised a classification of the Aquitaine caves by which a sequence in order of time is intended to be suggested by observing the form

and workmanship of the implements rather than the non-identity of the animal remains. Remembering that an elaborate classification, unless it deals with differences well defined, is more apt to cause than to prevent obscurity, the following are the groups into which the caves in the south of France are arranged :—

1. Caves producing large ovato-lanceolate implements, spear-like or round-headed, differing little from those of the river drift. No worked bone. Remains of mammoth and hyena comparatively abundant; reindeer few. No birds nor fish. Of these are the caves of Le Moustier, Peysac, Dordogne; and in Belgium the lower deposit of the cavern of Goyet, and some of the caves of the Lesse, an affluent of the Meuse.

2. Caves wherein the worked flints, chiefly lanceolate, are smaller and more neatly chipped than in No. 1, some being lozenge and leaf-shaped, resembling neolithic arrow-heads. A few lance-heads of bone. Of mammoth, no remains excepting a few teeth. Reindeer and horse abundant. Of these are Laugerie Haute and Tayac, on the Dordogne; also Solutré, in the department of Saone and Loire.

3. Caves producing no drift lanceolate forms; hatchets roughly chipped; edged scrapers numerous. Bone and horn implements more plentiful than in No. 2, in lance and dart-heads, but not barbed. A taste for ornamentation traceable in trimmed deers' horns, also bored teeth and shells. Tusks of rhinoceros and elephant seemingly collected and brought there. Remains of horse more plentiful than reindeer. To this supposed age some have

assigned the cave of Cro'magnon (wherein human remains were found), in the valley of the Vézère, and (but doubtful) the celebrated burial cave of Aurignac in the Haut Garonne,—of which more hereafter. In Belgium the Trou du Sureau at Montaigle is assigned to this group.

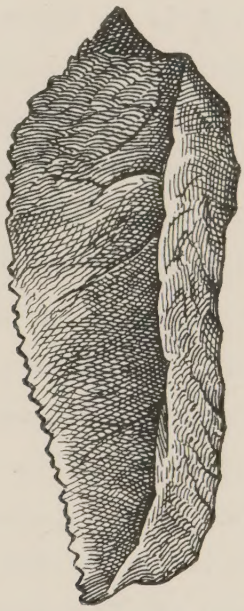


Fig. 12. Edged scraper.

4. Caves characterized by long flint flakes and scrapers. In some caves flint saws, also hammer-stones and hones. Barbed dart-heads of bone and horn, and eyed needles. Taste for ornamentation further developed; attempts at engraving figures of animals,—a degree of skill that seems later to have been lost or to have stood still. Remains of reindeer predominating. Bones of birds and fish abundant. Of this date are the caves of La Madelaine, Turzac, Les Eyzies, Laugerie Basse, and others, also the rock shelter of Bruniquel in the Tarn-et-Garonne.

In Belgium, Chaleux and the upper layer of the cavern of Goyet. To this age belong the most prolific and interesting archæological grounds of Southern France.

Although the classification of the French caves given above certainly indicates a difference in era of occupation, the question of continuous residence is no more settled thereby than it is by the cave relics of Britain. The cave of Le Moustier, for instance, could not have been the dwelling of man later than about the time the reindeer came in. In Solutré man did not come until reindeer was the main food. Hunters sought the cave of Cro'martin while reindeer were still plentiful, and herds of wild horses were available as food supply; while La Madelaine was taken possession of when the reindeer were beginning to retreat northward, and the supply of food had to be supplemented by fishing and fowling, water-fowl being killed by sling-stones and barbed darts of bone, 300 of which last were found beneath a stalagmite floor in the cave of Bruniquel. By the time the now existing type of game became established, the necessity for hunters occupying the caves ceased. They would thereafter have to follow their game in the open field.

As we have already sufficiently implied in our remarks on British caves, the scanty evidence offered (amounting to little more than supposition) does not overcome the unlikelihood of any cave having been the permanent residence of any tribe, or section of a tribe, for long periods of time, say for many consecutive centuries. The idea is well founded, that the men of the time of

stone had few wants beyond a plentiful supply of animal food, and it is clear that permanent residence in one spot would thin the game. Much more likely to imagine that parties of hunters, perhaps large, would follow the track of animals of the chase as the American Indians did the buffalo, and the caves that fell in their way be occupied

FIG. 13. Barbed spear, Dordogne. Length 9 inches, stem ½, bone.

temporarily by successive parties. It is true that some of these parties might have protracted their stay as long as land animals continued plenty in the vicinity, especially as salmon could be easily captured on the shallows, as in the Vézère and Dordogne, by means of the barbed spears we know they possessed. Another point may have a bearing on the case. From the earliest time when history

attempted to make a record of events by hieroglyphics on painted rocks, evidence has gathered that strife was the normal condition, that might was the substitute for right, and the weak were tyrannised over by the strong. Savagery would be always breaking out against individuals and families, and would be intensified when self-protection had driven families into alliance as septs. Indeed, it is astonishing how man "multiplied and replenished the earth" at all under a continual drain by hostility. This reign of the strongest must be taken into account in picturing the possible dwellers in caves. To occupy any one spot for a long time implies peace and safety that do not seem to have been the characteristics of early (or of any) savagery. If therefore caves were desirable residences,—although, as we have shown, they could only have been so as long as game lasted near them,—they would be seized by the strongest parties on the hunting path, and by them held only for such time as desirable. In those days the whole face of the country of forest and morass would not be penetrable in every direction, either to the hunters or to the game they pursued. Limestone cliffs presuppose valleys, and valleys indicate streams, within reach of which game would be found. There would therefore be definite hunting-routes, mainly following the water-courses. With this clue to guide our reasoning, it would appear more rational to suppose that caves along the routes were temporarily occupied at longer or shorter intervals by successive parties than that a permanent population dwelt peaceably in the obscurity of caves of limited extent for so many hundreds

of years that the face of the world changed, and whole races of wild animals perished, while totally different types migrated in their room. Successive occupation would explain differences in the relics from individual caves, which, although slight, are not to be fully accounted for by progressive improvement. An illustration, trivial in itself, may have a bearing on the point; namely, though impossible in a settled country like Britain, yet in new lands such as our colonies hunting parties, professional or amateur, often seek the wilds, remaining out for weeks, and coming on rock shelters that have no doubt been occupied by prehistoric aborigines, gladly make their quarters there for a time, and leave behind them relics that may puzzle future archæologists who shall find traces of a different civilization among the rude implements of the red men.

Archæology in Belgium is indebted to the untiring researches of Dr. Schmerling of Liege, a man who, like many other teachers, did not receive due appreciation in his lifetime. After many years' investigation of the contents of caves in the valley of the Meuse and its tributaries, he published an account of the remains of extinct animals mingled with evidences of the co-existence of man that he had found under floors of stalagmite. His principal discovery was a human skull,—known from the cave in which it was found as the Engis skull,—a similar one, but of lower type, that caused great excitement among physiologists, and known as the Neanderthal skull, having been discovered some years later near Dusseldorff, in Germany. M. Dupont's labours at Govern-

ment expense as successor to Schmerling have been productive of good results. Food in the Belgian caves, so far as investigated, consisted mainly of reindeer and horse. Fragments of pottery were found, but flint implements were less skilfully chipped than are those from the south of France, and some art scratches intended for embellishment are very rudimentary.

In Germany, stations similar to those of France have been investigated with like results.

Recent explorations in Poland have unearthed similar vestiges. In one near Cracow was a manufactory of implements of the jurassic flint of the neighbourhood nearly 2,000 specimens, chiefly flakes resembling those of the Dordogne. A few bones of the mammoth were deep in the *débris.* A second cave in the vicinity, evidently not inhabited until the neolithic age, had polished stone axes and fragments of ornamental pottery among the flint chippings. The food at the time was bison, stag, wild boar, and roe.

A discovery of much interest was recently made on the line of railway near Schaffhausen, in Switzerland, where two caves of the reindeer period offered several relics, especially etchings on bone, not unworthy of the name of attempts at art. One of these drawings is represented in Chapter XX. The description we have of the implements in flint and bone is unsatisfying, as not stating whether the former were ground or chipped, and the points of bone being loosely spoken of as "arrow" heads. From the remains near the surface being mainly reindeer, ibex, chamois, fox, and hares, it is not unlikely that these caves

bring us down to the time of bows and arrows. The lower deposit contains a few remains of the mammoth, indicating previous occupancy by an earlier race. No traces of the dog or of other domesticated animal.

Space suffices only to mention some other noted stations, as ossiferous rocks in Auvergne, near Mayence, near Mentone, the celebrated Franconia caves, the caverns of the Hartz, Carpathians, the Thuringerwald, all of which read similar lessons of man's occupancy at intervals up to about the time of the disappearance of the reindeer. Any occasional hunting parties who had temporarily sojourned in caves later than that era would have left their distinctive traces in the shape of arrow-tips in stone or metal.

Explorations in America have produced information similar to that of the caves of Europe, but differing in some minor points of detail. The weapons found are generally of the lesser, or cave, size, closely approaching to identity with the European, excepting that flint being scarcer in the New World, most of them are of other rocks, chiefly volcanic. Caves seem to have been used in what is now the United States and in countries lying to the southward more as burial places than as habitations for the living, yet several have been explored that show ancient traces of man's occupancy in the time of the existing fauna, with some few others that unmistakably show him to have been co-existent with the gigantic mammals. In the river-drift of the Delaware, palæolithic implements have been found at great depths closely resembling those from St. Acheul. These objects are of hard trap, and

the Delaware discovery is not an isolated one. In many places human bones as well as human handiwork have been found associated with the remains of extinct animals. On the Bourbeuse river in Missouri, Dr. Koch discovered the bones of a very large mastodon that had sunk in mud, where men had assailed it by throwing large stones and by fire. In Iowa and Nebraska authenticated instances are reported of rude stone weapons in conjunction with giant bones, and at several places in Mexico vestiges of man associated with remains of extinct animals, though more often in gravel than in caves. The early archæology of Central America is, however, a topic too vast to be touched on in this little book, belonging, as the subject does, rather to a more intricate branch of anthropology than to a mere attempt to follow the general traces of prehistoric man. The field there is boundless, but the explorer has not only to suffer the perplexities that every one meets who essays to draw aside the veil of time, but he has to contend with Nature herself in her most prolific moods, for she has covered up the tropics with a jungle of impenetrable verdure.

From the specimens engraved it will be observed that when the men of the caves had outlived the mammoth, they made their weapons smaller, but still followed the type of the older time in rudely chipped blunt spears and round-headed clubs. The illustrations in this and preceding chapters will serve to compare with the arms of the neolithic age of better finish and more symmetrical form. There was no absolute rule for these cave hatchets

and spears, the shape of the stone guiding the weight, and in a measure the shape, although the general outline

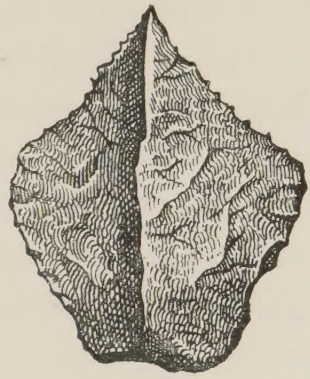


FIG. 14. Mud spear, ½-size, Le Moustier.

was attempted. A form of spear-head, almost peculiar t the cave of Le Moustier, and therefore known as the "Moustier type," is shown in fig. 14. It is dressed only

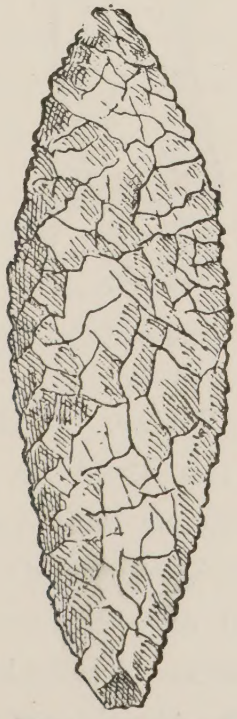


FIG. 15. Flint, full size, Dordogne.

on one side, the other being flat, and was probably used for spearing in mud. The small, neatly chipped lance-head (fig. 15), found in a cave of the Dordogne date, must have been fashioned for some special purpose. It is too slender to be serviceable in any serious encounter, and too heavy for projection, excepting it might be as a light dart. When working in bone became common, the use of implements of that material was greatly extended, but not to the exclusion of flint. Fig. 16 represents a bone whistle

Fig. 16. Bone whistle, Dordogne.

found in a cave of the Vézère. It is somewhat singular that the dwellers in the Aquitaine caves seem to have been ignorant of pottery, at least no fragments showing an acquaintance with it have been discovered.

The summary of all cave exploration is that in one period of the Older Stone Age in both continents,—but whether at one and the same time in point of date we

have no means of knowing,—men of a low order of intelligence had their occasional, if not permanent, habitations in shelters of the rocks; and in pursuing our subject it will be seen that there certainly appears a gap in the scale of gradation between the close of the cave era and an advanced system of weapons in which light projectiles form the leading feature, thereby showing that there had been in the interim the vital invention of the bow and arrows. Whether this vast improvement, so applicable to the changed conditions of hunting, arose, as some have supposed, from large streams of immigration flowing from the East and bringing a higher step in civilization, or whether European aborigines had abandoned cave life for so long a time that they themselves originated the improvements, it is not here necessary to determine. Suffice that the clumsy palæolithic manufacture of flint was completely superseded by the more skilful chipping and design of lighter implements, which in their turn were improved into handsome articles polished and perforated. It is this neolithic age we now proceed to consider.

CHAPTER VIII.

NEWER STONE AGE (*Neolithic*).

Celts or Axes, Hatchet-hammers.

Newer Stone Age, its Weapons.—Celts.—Classification of Celts.—Various Materials of which made.—How fitted.—Uses.—Mussel-Shell the Theoretical Design.—Subtriangular Form.—Ordinary Form of Chipped Flint Celts.—Celts with Ground Edge.—Forms of Edges.—Polished and Ground.—Amazon Axes.—Two-edged.—Wedges and Mining Estampes.—Perforation of Stone, and how accomplished.—Socketed Celts.—Forms of Single and Double-Edged.—Hatchet-hammers.—Migrations traced by Type of Ornamentation.

The Newer Stone Age is dated from the supposed time when men mainly had their habitations in the open country, either as wandering huntsmen or drawing gradually together in villages. Consequently the records of human handiwork of the period are found in surface soil, and in numbers so great in all parts of the land that either the population must have then greatly increased or their wanderings must have been extensive, or both. The relics thus found are of lighter make than formerly, although still of stone. We have seen that the larger implements of the older age were masses of flint, six to ten inches or more in length, but now they were reduced

to from four to six inches, and made much thinner to answer the purposes to which a modern axe is applied. These improved axes of stone are known in archæology as "Celts." The name is somewhat inaccurately given to all stone implements, large or small, of axe shape.

The celt, or axe, indicating as it does a new order of wants, was undoubtedly the most important implement possessed by the advancing race of men. Presumably the earliest among their inventions, its use continued to historic times. In some manuals the comparative length, width, thickness, and roundness or flatness of the sides of celts are all made the subject of classification, but too elaborately for popular study. A sufficient arrangement will be :—

1. Celts fashioned by chipping only, and not ground or polished.
2. Chipped celts ground and polished on the cutting edge only.
3. Those more or less ground or polished over the whole surface.
4. Polished, ground-edged, and bored with a socket-hole for shaft.
5. Two-edged.
6. Hammer-axes (hatchets).

The material of celts was flint where it could be obtained, that substance having the desirable requirements of hardness, sharpness of edge, and ease of cleavage. Beyond the range where flint is abundant, they were manufactured of any suitable stone, usually silicious,

quartz, porphyrite, whinstone, basalt, felstone, green and hone stones, jade and jadite, mica-schist, and others, all of which may be seen in museum specimens. Two wherein the wooden handles have survived are respectively in the British and Liverpool museums, and show the one head clasped in a cleft stick, the other attached to a handle by lashings of hide.

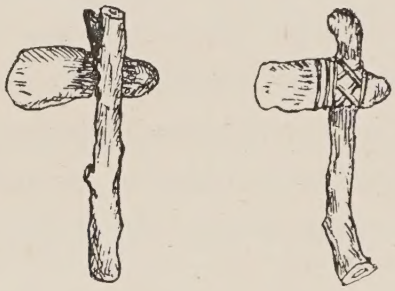


FIG. 17. In cleft. Lashed.

As to the general uses of celts, they were many. Certain essayists have settled to their own satisfaction that the main use was in cutting down trees. Now, in the first place, very early man had no use for trees—timber, properly so called, was beyond his wants; and in the second place, timber-cutters in the American forests have assured the writer that it would be impossible for all the men who could cluster round a tree-trunk of even moderate diameter to cut it down with celts. When men had reached the use of boats hollowed from logs, they no doubt found abundance of uprooted trees without the trouble of felling them, but would carve and shape them with these axes of stone. Certainly the celt would be put to all the many uses wherein the colonial settler of

to-day finds his axe of steel so "handy." Early men would use it for cutting coppice poles for various purposes of building, for clearing tangled underbrush, grubbing up flexible roots for cordage, cutting faggots, and the like. None of these purposes required any special adaptation of weight or shape in the make of implements. Axes of stone were likewise weapons of the chase and of war.

The axe-makers of the new period were in advance of their predecessors, in so far that these were guided in the form of their work by the chance shape of the flint they hammered, while later artificers wrought to pattern. This theoretical design was the conformation of a mussel

FIG. 18. Mussel, *Mytilus.*

FIG. 19. Section of mussel.

FIG. 20. Section of early celt.

shell, or rather of the closed bivalve. Celts from all parts of the world at first follow this design; and it may be traced more or less clearly through the gradual changes of truncation, elongation, and other slight divergences, until in course of time experience led to better acquaintance with the line of applied force. The mussel pattern, however, does not seem to have immediately followed the older shape, but to have passed through the intermediate form of subtriangular.

Unlike articles cast in a mould, but like human faces or even like leaves of trees, no one celt is absolutely identical with any other, but has some slight characteristic of handiwork to distinguish it. Fig. 22 represents a common form in chipped flint.

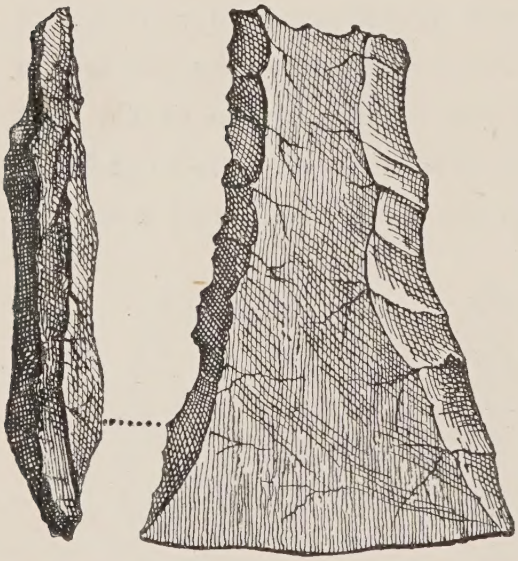


Fig. 21. Danish Kitchen Midden.

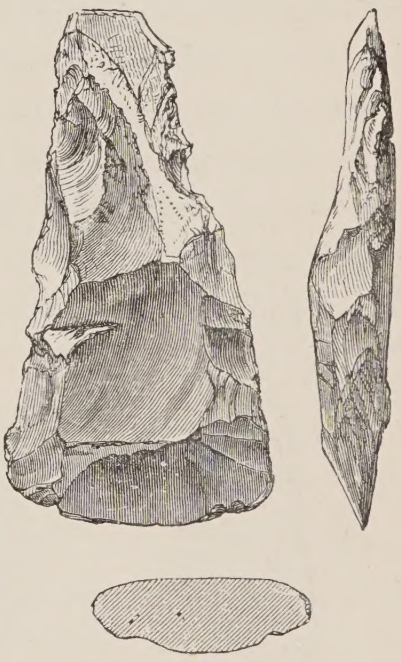


Fig. 22. Thetford.

Another form not uncommon in stone other than flint may be seen by referring to fig. 25, where a polished specimen is presented, and it may be mentioned that this shape is identical with some North American axes. A large specimen would measure 8 inches in length by $3\frac{1}{2}$ inches across the cutting edge. Celts of this form and character are found in France, Belgium, Scandinavia, England, and Scotland, but rarely in Ireland. A manufactory of them seems to have existed at Cissburg near Worthing, and another at Mons in Belgium. The rarity

of finding two facets of a cleft flint to form a straight line so as to make a clean cut, would in time originate the idea of grinding the edge on a slab of sandstone or other gritty substance; and it is observed from the scratches on museum specimens, that axes have been so

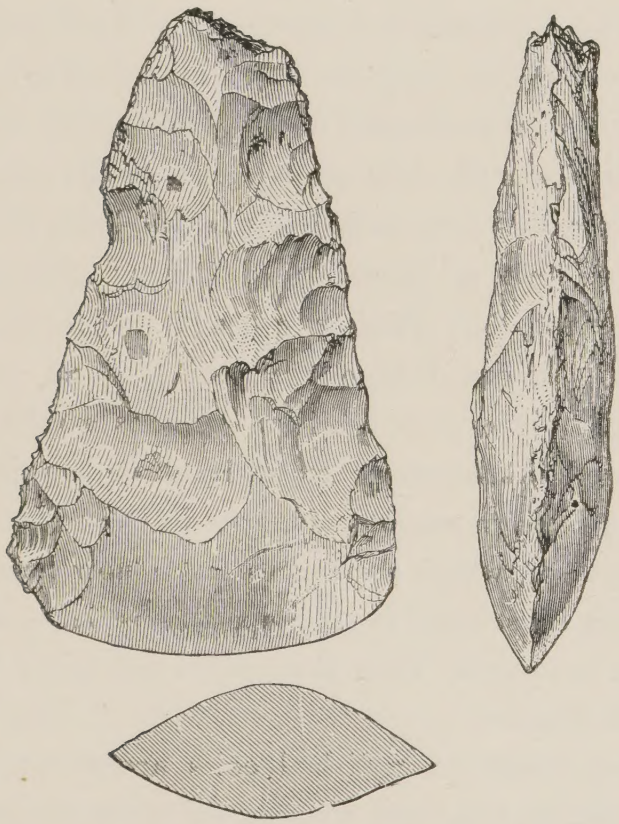


Fig. 23. Anglo-Saxon celt, ½-size.

ground, patiently, on a fixed, not rotary grindstone. It was but one step further in intelligence, and a further exercise of patience, to grind the surface all over. This superfluous labour of polishing the surface of implements marked another era. Fig. 23 represents an Anglo-Saxon

chipped flint, partly polished and with the edge ground, which may be taken as a fair type of its class.

His arms are the most valuable thing that a savage possesses. Hence we may look for a high degree of care in their manufacture to render them effective. But when, more than this, we find bestowed upon them *superfluous labour that does not increase their efficiency*, but is merely intended to give them an adventitious value, we come on a new and higher phase of mind that already discloses the first steps taken in the road to what is properly called civilization. It is the dawn of ornamentation, the first glimmering of luxury, filling not an absolute want, but setting up a fanciful standard of value. To reason this out would lead us out of our record. At all events, additional wants would grow out of advanced intelligence; or at least we are justified in imagining so from various changes in the shape of implements, some of which appear to have now been adapted to specialities, several British specimens being so small—$2\frac{1}{2}$ inches in length—that they could not have been used for rough service.

In most museums polished celts are in the majority, either because they are considered more worthy of preservation, or perhaps from an impression (which we do not here stop to discuss) that more of them exist. Many show considerable departure from mussel shape. Some are flat on one or both faces, others with the blade thicker or thinner and sides sharp or round, pointed or expanding at the butt, and with the width of the cutting edge more or less contracted, difference in the line of

edge being also frequent. Discussion has arisen as to whether the oblique edge (see fig. 24) may not be the result of wear, but observation of modern North American stone axes shows the shape is intentional, and, besides, a half-moon edge would not always be worn away in one identical curve by fortuitous wear. As a rule, with many exceptions, the proportionate dimensions of celts are in length from $2\frac{1}{2}$ to 3 times the width. Ordinary polished specimens, in flint and other stone, are found in Scotland,

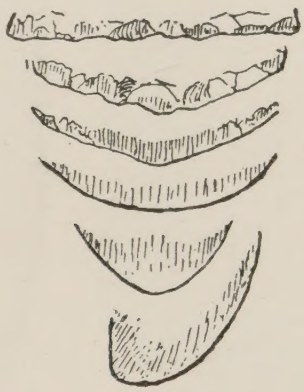


Fig. 24. Edges of celts.

Northumberland, Durham, Yorkshire, Devon, Suffolk, and some other counties. Fig. 24, of porphyritic greenstone from Cambridgeshire, conveys a good idea of the polished celt. Occasionally a specimen occurs of a much-elongated shape, almost resembling a modern broad-chisel. A few rare instances, all small, bear a resemblance to a Roman lictor's axe, and are spoken of as "the Amazon axe," but the name is misleading. They have been found in Yorkshire. This form on a larger scale is common in Denmark.

Unbored two-edged axes with both edges ground may have been held in the hand as tools rather than shafted for offence. At the same time the less unwieldy of them, if hafted, would have made effective weapons of combat. Two of great size, one of greenstone, 13 inches

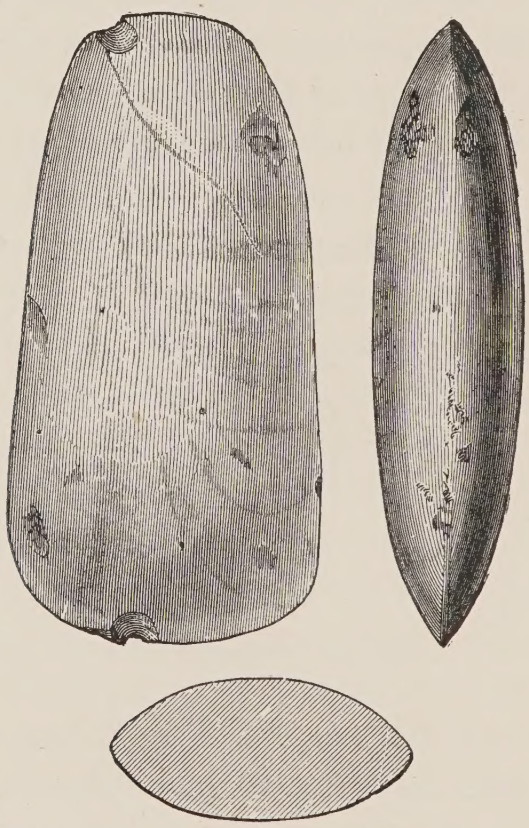


Fig. 25. Polished celt.

in length by 3 in width and 2 in thickness, and another similar of porphyry, nearly 4 inches in width, are in the Edinburgh Antiquarian Museum. These would be serviceable implements in hollowing logs for boats ("dug-outs"), and may have been made with that view. Other celt-shaped tools, yet more ponderous, unpolished,

with one end ground to an edge and weighing up to six pounds or more, have been recovered from various parts of the kingdom. Specimens range from a foot to a foot and a half in length. One found in Lancashire weighs $6\frac{1}{4}$ lbs., and another roughly chipped Danish celt 6 lbs. 14 oz. Such masses of stone are obviously too ungainly to be used as weapons, and are therefore correctly known as "wedges," their intention being evidently for cleavage. In this connection may be mentioned certain large implements that some antiquarians have regarded as weights for anchoring fishing-lines, and others as crushing-hammers used in mining operations after the discovery of metallic ores. They are equally adapted to either purpose. These heavy objects, in weight forty pounds and upwards, are merely pebbles or blocks of stone roughly cylindrical, with a channel cut around the middle as a groove for the rope to which they were attached. Most of them have been found in districts where ancient mining operations are shown to have been carried on, although they have also been discovered near the sea-coast. Their mode of use as crushing-hammers might have been by pulling and relaxing a rope to which they were geared over a fixed bar as a substitute for a pulley, thus letting fall a succession of heavy blows on pieces of ore spread beneath on a rock bed. If as anchors, their weight would be none too great in a channel-way; and their use for such purpose, if correctly surmised, would show that men of the time had boats that put to sea, and that they drew a part of their subsistence from the water.

We now arrive at a period in the relics of the stone age when polished celts and other implements were perforated with socket-holes. Not many have been found of bored flint, but many of metamorphic and other rock. These belong exclusively to the later stage of the Newer Stone Age, and show a great advance in eye for form, as well as considerable calculation and mechanical expedient.

An amateur carver would find it puzzling if required to bore a hole through stone some inches in thickness without the aid of metal tools. Yet this was what the artificers of the Later Stone Age did, and they have left highly ingenious specimens of their work. Experiments, however, made by archæologists as to the practicability of the boring process, show that it is practicable in one of three ways—by picking, by grinding, and by drilling. All these processes can be accomplished by a mere sharp-pointed splinter of flint, or by a rod of wood or bone used in different ways. Any one of these methods, or all of them united on one specimen, required a vast expenditure of patient work. Trials show that if the shining surface of flint is roughened by the application of sand, a sharp triangular-pointed pencil of the same is capable of making scratches on the face of the material worked on, in like manner as a diamond scratches glass. This scratching or engraving process being kept up by a succession of sharp etchings, until the exact dimensions of the proposed socket-hole is sunk one-eighth of an inch or more beneath the surface of the stone, a "rubber" of wood that will turn freely in the groove is substituted. Sharp sand and water being renewed as required, the rubber is rotated

rapidly, either completely around or in a half-circle by the palms of the hands. The hole with a smooth floor as it descends in depth is thus literally ground out in process of time. Time, however, was of little importance in a state of life where so crude a species of manufacture could obtain. We can judge from existing specimens that a further improvement, or at least another method, was sometimes resorted to by boring out and extracting a core instead of grinding an open tubular hole. This was evidently done by rotating an ox-horn or other tube with sand and water, instead of a solid wooden rubber. The effect of this ingenious device was to excavate a circular trench around the core instead of wearing down the whole floor at once. Generally the socket-holes are larger on either face of the stone, as might be expected, for the rotation being made by hand there would be room for play near the surface, and the hole would become of hour-glass shape. The fact that pottery cotemporaneous with perforated axes is all hand-made, and not turned on a lathe, precludes the idea that perforation was effected by means of that appliance. The reasoning, too, leading to the belief that weapons could be improved, was easy. Hitherto the weakest part of a fitted axe was at the insertion of the head in a cleft stick, notwithstanding that it was bound with ligatures of wet hide that contracted in drying, and was additionally secured by vegetable mastic, yet the junction would not stand a succession of heavy blows without loosening at the joint. This, it was apparent, could be overcome if it were possible to bore a hole through the head itself and fit a

shaft directly through it. And in time it was discovered how this could be done.

The discovery of perforating stone without the aid of metal tools opened a new phase in the processes of manual art. From the additional labour bestowed, weapons became of more pretentious finish. Shape evidently became attended to, as a quality pleasing to the eye and as thereby increasing the value. Hence some of the implements of the time are on lines that may be called graceful.

Most of the highly finished and bored celts found in Britain, and still more on the Continent, are assigned to a time when bronze was already beginning to be known. This might in part account, but would not altogether account, for the improvement of shapes in stone, for few of the stone-workers would have had a chance of seeing the less clumsy patterns in metal. At all events in these perforated and polished weapons and implements, we are placed in presence of the highest development that man's ingenuity was capable of at the time with the crude materials within his reach, until the art of smelting and hammering ores opened to his intelligence a field that has not yet been exhausted.

The commonest form of bored celt is given in fig. 26.

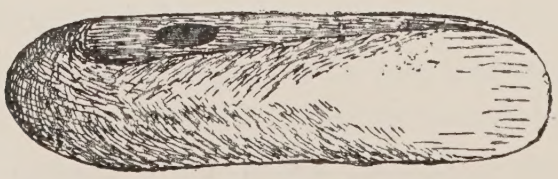


Fig. 26.

When of full size it would be from 5 to 7 inches in length, with socket-hole of sufficient bore to hold the shaft firmly, especially when wedged with a collar of deer's horn. More fanciful shapes are met with, as for example in fig. 27, of serpentine, found in the Thames and now in the British Museum.

Fig. 27. Serpentine, $\frac{1}{2}$-size.

Two-edged celts in several variations of form were likewise perforated. Usually they present a lozenge form when viewed from above, with the socket placed midway between the two ends. Instances of this type are found in England, Scotland, Sweden, Hanover, and France. The Sussex Archæological Society has published an engraving of a beautifully designed, boat-shaped, double-edged axe-head of ironstone, 5 inches in length by 2 in width. Others not much dissimilar have been obtained from Yorkshire, Derby, Worcester, and Wilts.

Looking through any extensive collection, it cannot fail to be observed that the form of the celt was gradually drawing towards the idea of a hammer for the performance of lighter work. In his first stage man had no

variety of tools, and needed none. To force a simile, it may be said that the man of one tool is like the man of one book—he has his one craft always at his finger-ends. This is well illustrated by the one tool of the Canadian "lumberer" (woodman), who with his steel axe, of three pounds and upwards in weight, equally fells giant trees by delivering blows within a hairbreadth with the precision of a machine, or shapes any form of deal by a few pats of the edge, or carves some toy for his children. The multiplicity of uses he puts it to must have been rivalled by early man; and when the latter found that he wanted a diversity of tools, such as lighter hammering implements that would drive pins, bolts, and so forth, it clearly indicates an expansion of his industry and an enlargement of his views. This gave rise to the new class of domestic implements that may be called indifferently "hatchet-hammers," or "hammer-hatchets." Generally they are of lesser size than celts, ranging from $2\frac{1}{2}$ to 5 inches in length, and of different weights. Doubtless they had become necessary as carpenters' tools for joining materials in woodwork. There is no fixed design for these implements, and great skill must have been required to make this form of axe.

Leaving out of account the question whether the steps of improvement were always consecutive, the intelligent reader cannot have failed to see by the sketches that illustrate these pages that the work of earlier men had a tendency—slow as it might be—to approach towards ornamentation. Whereas the practical forms of his workmanship were determined by the demands upon

them and became of general adoption, the ornamentation expended arose from the special taste of that person or portion, large or small, of that people by whom it was attempted, and hence possesses a certain individuality. An identity of shape and use of necessary handiwork throughout the race may therefore be looked for, but not an identity of ornamentation. Herein is opened a vast field of research that we believe has not yet been adequately entered upon by ethnologists; namely, to prepare charts of districts in which one type and kind of ornamentation can be traced in the antique relics. The study of early archæology is, as we have said, but young, the past misty but clearing, and the opening vista boundless. Many more years of close observation, and many observers, will be required before attaining clear and comprehensive results; but may we venture to believe that the clue to man's early migrations will be found by tracing and following up the comparative degrees of ornamentation.

CHAPTER IX.

NEWER STONE AGE (*continued*).

Lances, Darts, Daggers, and Arrows.

Smaller Weapons of the Chase indicate smaller Game.—Theory of Spears.—Measurement and Weight of Spear-heads.—Materials of which made.—Lance-shafts.—Javelins.—Efficacy depended on Weight and Robustness of Make.—Shields.—Daggers, British and Danish.—Arrows.—Invention of Archery.—Its great Importance to Early Man.—Progressive Steps therein —Classification of Arrow-heads.—Did Early Man poison his Arrow-tips?—Singular Miniature Arrows of Mound-builders in Writer's Collection.

In a state of life where food has to be obtained by hunting, the most important weapons of the chase are missiles, —that is to say, arrows,—excepting where the hunters are mounted, as the Indians of the American prairies and pampas are. Unless under these circumstances, close encounters within arm's length are comparatively infrequent. Hence the interest in studying the arrows of the neolithic age, for careful search has failed to find any of the palæolithic.

The general use of light spears and arrows indicates a change at once in the mode of attack and in the quarry to be attacked. It proclaims to us that the game to be pursued was of lesser size than when ponderous pikes were necessary to slay it; and, besides, that greater

agility was required in close engagement with light cutting implements that had to be used either as projectiles or held in the hand, and, yet further, that the animals, being swifter or more timid than of old, were difficult of approach, and had to be reached from a distance. Hence rough stabbing implements of some pounds weight came to be superseded by sharp, slender lances weighing but a few ounces, and arrow-heads of slight weight. A number of spears put on the scales from the writer's collection give an average weight for small spear-heads $2\frac{1}{4}$ ounces, measurement 3 to 4 inches, full size 5 to $5\frac{1}{2}$ inches, and weight ranging upwards from $2\frac{1}{2}$ ounces, according to the density of the stone. An average British specimen would be about 5 to 7 inches in length of blade, with a greatest width of one-third of that length, and in thickness from half an inch, or more, declining to an edge, either chipped or with the point, but rarely the edge, ground. Lance-heads of great length have been found in various parts of the Continent. One from Mons, in Belgium, where was a factory of stone arms, is $10\frac{1}{4}$ inches in the blade, and elsewhere others approximate to that length. Some of yet longer measurement that have been mentioned, but not described, are of doubtful authenticity.

The theory of a lance-head is, that its line of centre, or backbone so to speak, should be strengthened by a ridge of greater thickness from which the material is fined away to the point and edges at a greater or less angle of declination. From want of skill, or stubbornness of material, this intention is not always carried out; but it may

generally be traced, especially in javelins, where the shock of the striking blow requires stronger material than in the lighter spear. An estimate of this greater robustness of make will sometimes assist in assigning a specimen to its proper class, whether of spear or unbarbed dart. It is well to guard against too great refinement of classification where the implements to be classified are so few—namely, spear, dart, arrow, and dagger—all of which run into each other both in shape and use.

Spears (as we have said) were intended for light work in close encounter, and for rapid blows given from the point against a yielding substance. For this purpose a sharp flint would be sufficiently penetrating, and three inches depth of stab, or less, would kill. The length of the stone head would not represent the whole power of shafted weapons. Driven with force, a length of the shaft itself would penetrate the wound. Hence these primitive huntsmen, when they became fighting men and turned their spears against each other, were much more formidable than a cursory glance at their seemingly puny weapons would lead moderns to suppose. If, as is likely, each individual owner of arms possessed skill enough to chip his own axe, spear, or arrow, it would supply him with a lazy industry in the intervals between huntings. One celt might be sufficient for one individual's equipment, but there was no reason why he should not fashion for himself more than one javelin and an ample supply of arrow-tips.

The material of which spear-heads were made was at first flint, but in process of time other stones that were

hard, light, not brittle, and that could be sharpened to a point, were largely employed, although flint spears were prevalent down to Anglo-Saxon times. Judging from

Fig. 28. Notched, ½-size.

the *handiness* of the weapon, the shaft of spears would be long, therein differing from javelins. Cossack and Polish lances were doubly effective on account of the length of shaft, and it has been thought by military ex-

perts that the lances, 12 to 14 feet long, of our Royal regiments of lancers are too short. This may guide to the length of shafted lances of stone, most likely manœuvred with both hands; but the length and weight of the head would regulate the length of the staff. Spear-heads of the Newer Stone Age are much more frequently lanceolate than tongue-shaped, yet occasionally approach the circular in outline, although these, perhaps, were rather scrapers or parers than stabbing implements. Such form has been found in several localities. One from near Stonehenge was no more than a quarter of an inch in thickness, as was another, lozenge-shaped, from Suffolk. Spears notched at the sides to hold the ligatures that bind the head are found of flint and other stone. The specimen, fig. 28, is $6\frac{1}{2}$ inches in length by $2\frac{1}{2}$ greatest width. Spears and arrow-heads thus notched are common in America. An elongated specimen from Dorsetshire, $3\frac{1}{4}$ inches in length by $\frac{7}{8}$ths, is given in fig. 29. Danish flint chipping is in general much superior to the average, the material being pared smooth with great skill, and often serrated with a neatness that would seem to have required the aid of metal tools. Fig. 30 is an implement of this description, full size. The Canadian specimen, fig. 31, in slate, represented half size, was found by the writer on the shore of the Gulf of St. Lawrence. It bears a close resemblance to the Anglo-Saxon type.

The mission of the Javelin or Dart in hunting was to reach a prey when brought to bay or when within easy distance, where an arrow would not be so immediately

fatal as to prevent escape of the wounded animal. Whereas the efficacy of a spear stroke was given by the direct muscular power of the arm that dealt it, the power

Fig. 29.
Flint, full size.

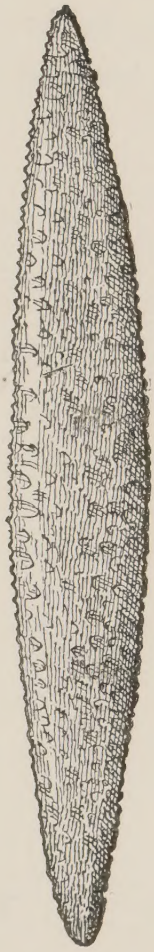


Fig 30.
Flint, serrated, Danish, $\frac{1}{3}$-size.

of a javelin, being weakened in proportion to the length of its flight, depended greatly on its own weight in piercing the mark. We therefore find this missile of greater weight and more rotund shape than the spear. Several

stabs could be given with great rapidity by a spear, while a javelin could give but one, and would fail in its effect unless immediately fatal. In historic times it was customary to hurl darts attached to a line, which rapidly uncoiling as the missile flew was little drag on its flight. Hence, too, the reason why javelins were barbed and

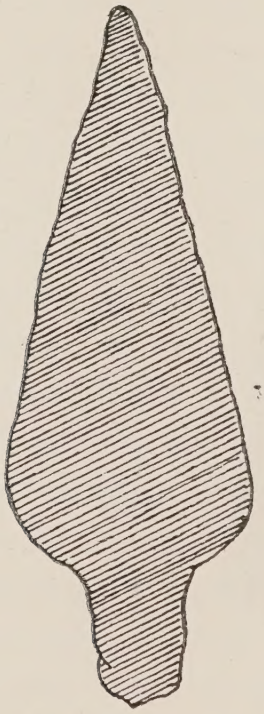


Fig. 31. Canadian, slate, ½-size.

spears not. Spears would be used for a rapid stab and rapid withdrawal from the wound; while darts would be thrown from ambush, and the barbs penetrating the body of the quarry would hold it fast until it was otherwise killed. A modification of the same principle underlies the use of barbed arrows shot at small running game or

at fowl, when the arrow and shaft, adhering to the prey, would act as an impediment, and make the flight of the

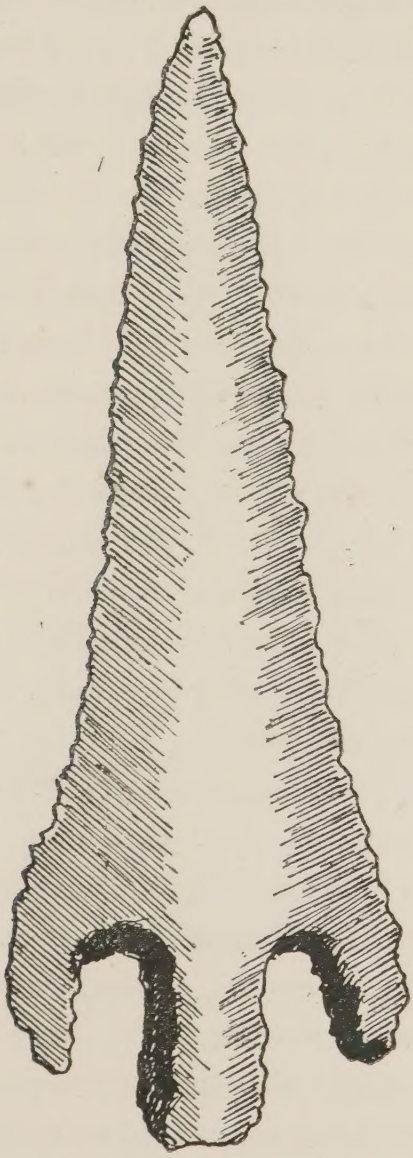


Fig. 32. Isle of Skye, full size, flint.

victim slower, until it fell from exhaustion. Much manual skill and some theoretic knowledge of trajectory is noticeable in more highly finished javelins in the cur-

vature by which the barbs are strengthened. The same knowledge no doubt regulated the length of shaft. Unlike spear-shafts, javelin-shafts would be short and graduated to the weight of the head so as best to guide its flight. Roman war javelins, it may be remembered, had a shaft of only $4\frac{1}{2}$ feet, but the head was heavy.

Appended are two illustrations of fine specimens of javelins that might have been equally suitable as weapons or as hunting implements. The first (fig. 32), of flint from the Isle of Skye, could not be much excelled as a harpoon by a modern lance for spearing seals, for which purpose it seems likely it was intended, as without doubt the rocky shores of that island were the haunts of more than one variety of *phocidæ*. The second (fig. 33) from the Yorkshire wolds, and now we believe in a private collection, is about 3 inches in length of blade, and one and a half between the barb points. Javelins are fashioned of any suitable stone.

The mention of javelins naturally leads to the questio of shields. Javelins were not thrown with both hands, therefore one hand and arm were free during a combat. The same degree of intelligence that designed, fashioned, and fitted the weapon would be equal to some means of intercepting it when thrown. We may therefore feel justified in supposing that shields were as much an equipment in hostile engagements as the weapons themselves, especially as modern savages, even the least advanced, are provided with this means of personal defence. Shields at once simple and efficient could be constructed of basketwork covered with hide. This

would of course be perishable. We cannot recall an account of any relic having been found that must unmistakably be set down as a shield, yet it may be safe to assume that bucklers of some kind were employed as a defence against hand missiles.

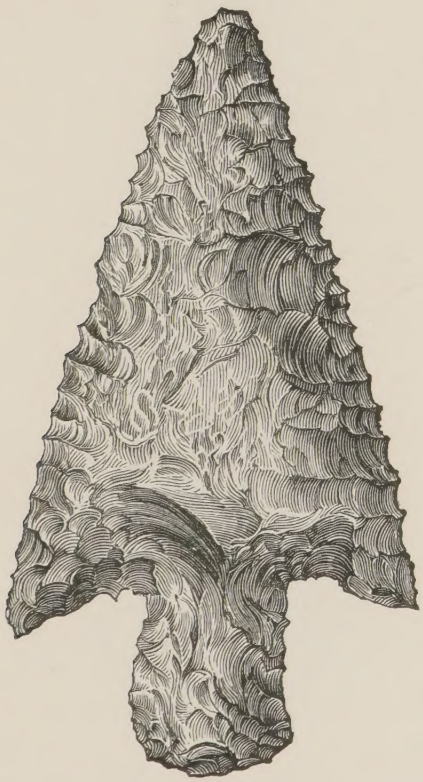


Fig. 33. Flint, nearly full size.

Another variety of pointed blades must be mentioned, especially as they are apt to be mistaken for spear-heads. These are Daggers, of which Denmark supplies the finest specimens, beautifully finished with ripple marks and squared hilts. The finer Danish are referred to a period immediately preceding the coming in of manufactures in

bronze. An illustration is given in fig. 34. The ordinary British form, generally lanceolate, is of flint, thin in section, about 5 to 7 inches or more in length by $1\frac{1}{2}$ to 2 inches at greatest width, which is about one-third distant from the point, and the point sharp. An outline of

Fig. 34. Danish dagger, flint, $\frac{1}{3}$-size.

one (fig. 35), still 7 inches in length, although evidently ground down by successive sharpenings, is given here. It was found in the Thames. A dagger of this kind attached to a hilt might be stuck in the belt or carried in the legging, as Scottish Highlanders were wont to carry a *skene dhu.* When the art of perforating flint became

known, dagger blades were sometimes bored with an eyelet hole for attachment to the person by a thong.

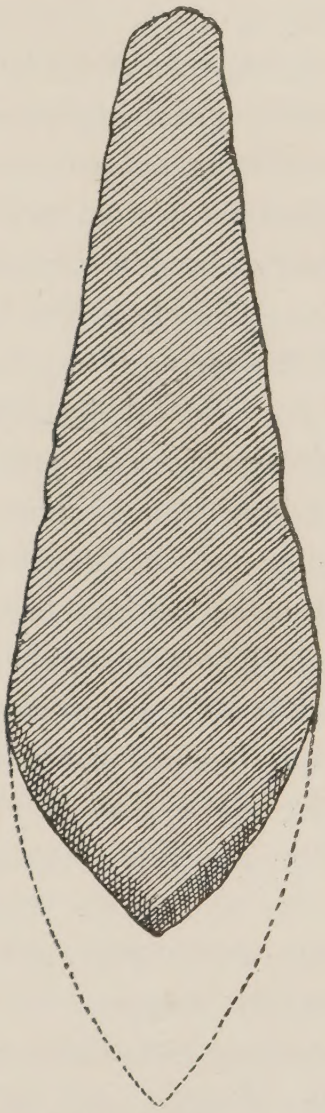


Fig. 35. British dagger, flint, ½-size.

Daggers are not uncommon in England, rare in Scotland, not known in Ireland, but somewhat abundant in the north of western Europe. Before the discovery of metal,

primitive man could have had no equivalent for swords. A light, short-shafted spear would be the nearest approach, and the dagger was a formidable addition to his personal armament.

The adaptation of Arrows (that is to say, of smaller javelins) to an elastic bowstring as a means of propulsion affords an interesting subject of speculation. It is impossible to imagine the custom to have sprung at once into use. Preliminary ideas improved upon could alone have wrought it out. Clearly it was the result of successive steps, and did not spring into general adoption from a single instance of accidental discovery, as perhaps the use of fire did. Arrows were an acquisition as useful to the savage as the invention of gunpowder was to later man. Moreover, it marked in the primeval race the point of passing beyond mere instinct into skill as the result of thought, for a good bow is as much a work of careful appliance of materials as is a Cremona violin. Without the bow human intelligence would have remained but one or two degrees above that of those man-like apes that use clubs; for the new invention furnished the superior animal with a portable weapon that at once vastly enlarged his destructive powers, increased his safety, and lessened his fatigue. It would not be too fanciful to liken the projectile arrow in the hands of the earliest men to the fancied *vril* with which Bulwer Lytton arms his "Coming Race." Let us analyse the steps by which this important implement was attained.

The first motive power that must have fallen under observation would be the resilient bow of a tree. Apes

have observed this quality, and make use of it by seizing a branch and suddenly springing it, thereby projecting the fruit to more or less distance. From this the use of an elastic bough as a means of projecting a weight (a stone, no doubt) would be but a step. Here we have at once a fixed sling—*ballista*, a formidable siege engine of mediæval times. An incident which may be true is related, that in the Cabul war a small British contingent beleaguered in a fortalice where the ammunition had run short, successfully defended it by hurling stones of several pounds weight on the heads of the besiegers from a ballista made with elastic firewood poles. A similar construction, used from an ambush, would be efficient against a herd of animals in the field. No vestige of an implement so perishable would now be found, yet chipped stones that could scarcely have been designed for other use than sling-stones testify to the knowledge of projecting them from fixed or hand slings. Not all modern savages when first known were acquainted with archery; the New Zealanders, for instance, though of a comparatively high grade, had no missiles save spears thrown from the hand.

Doubtless the first attempt to project a shafted missile farther than it could be thrown, would be to adjust an ordinary spear or javelin to an elastic bough, and cast it off by the recoil. Although this would of course be a failure, it was in the right direction. As already mentioned, cordage of some kind is a necessity of mankind the least advanced, and is one of the most easily supplied as well as the earliest. Ropes of flexible root or vine

made use of in pulling the bough of the ballista would suggest fitting the projectile on the rope itself, which by its elasticity, when stretched to its tension and suddenly let go, would propel a javelin forward to a distance greater or less. This fact ascertained, the discovery was made. All that remained was to stretch the string on a portable bough and diminish the weight of the missile, so that it could be shot to a considerable distance, yet still retain force to wound. No doubt further improvement was the work of time. The bow itself, combining as it does the principle of the thrown javelin and the sling, having been discovered could only be improved mechanically; but the laws of arrow-flight had to be formulated from lengthened experience. Weight of missile adapted to the strength of the bow and bowstring and force of the archer, the line of trajectory, the form and the shaft that with a given impetus would fly farthest by offering the least resistance to the air and with greatest power of penetration, with other points of the toxophilite art, would be elaborated gradually. Although no data exist for the periods of time the successive improvements took to accomplish, nor even for the order of sequence, the art of shooting with the arrow at length settled down to a universal practice, guided in its details, no doubt, by general and long-continued experiment.

The many arrow-heads recovered in all parts of the world make it clear that multitudes were lost. There would be few expeditions in which hunters would not miss one or more among the brushwood. Much labour would not therefore be wasted in chipping for common

use missiles so easily lost when carelessly shot away. Indeed, a fracture from any quartzose pebble would serve as substitute when the supply of wrought ammunition failed. Arrows polished as well as more neatly fashioned show that the process of manufacture came to be simplified and shortened as to the time it took to produce them. In places where a large number of heads have been found within a limited space, some cause other than carelessness presents itself. The locality might have been the scene of a *battue*, or of a tribal encounter; but in this latter case it might be expected that javelins and spears would also be found there. At first individuals fashioned their own arrows, but afterwards there were factories for their production, several of which still show yards full of flint chips.

It has been well said, in attempting to account for the close resemblance of arrows in all parts of the world, that where wants were the same, and scanty materials for supplying them the same, the results would be alike. This is doubtless the truth, but it does not cover the ground. A savage rarely originates, but imitation is one of his most marked characteristics. May it not be readily explained that one portion of the race copied from another? Failing this solution, it is impossible to believe that multitudes of isolated and unimaginative groups, each following a local taste, should arrive at so complete an identity of execution either by their own unaided tact or by chance. This close similarity of implements has a bearing on other points, among them that the population at some period was numerous, and that

bodies of people must have been migratory, else they would not have come in contact with others from whom to learn the standard pattern that grew into world-wide use. Other speculations arise, but we need not here follow the channels into which they lead.

Among the first arrow-heads of flint described in England was one found on the Dove by Charles Cotton, the friend of Isaac Walton. Attention being drawn to the matter, further search was quickly rewarded by finding numerous others in different parts of the kingdom, until now every museum contains specimens. Following the form of spear and javelin heads, arrow-tips, if unbarbed, are in general lanceolate, leaf-shaped, lozenge, or sub-triangular in shape. If barbed, the completed outline follows these figures, with spaces filed out to form the barbs. Those with barbs have either one wing or two, the former being much more rudimentary in execution, and probably in use before greater skill achieved double flanges. Indeed, some of them are little else than a triangular head, with one angle drooped to form the wing. Single-winged seem to be peculiar to the United Kingdom, and are not uncommon on the Derbyshire moors. Double-winged without stem are frequent, of comparatively large size, in Ireland. Barbed, stemmed arrows are the most common forms found in tumuli, from which we may deduce that the unstemmed and unbarbed were those in use prior to mound burial. Yorkshire and Wilts are prolific in arrow-heads of various forms. Antiquarians differ as to which of the four usual forms of arrows comes first in sequence of date. Perhaps tri-

angular may be regarded as the primary form, followed by lozenge, which by an easy gradation passed into the stemmed leaf-shaped. The lozenge, however, may have been the latest from the greater ease with which it could be inserted in the cleft end of the arrow-shaft. In dimension ordinary arrows vary from half an inch to full two inches in length, beyond which they may have been heads of darts or knives rather than arrows. Weight

Fig. 36. Barbed, without stem.

varies from 30 grains to half an ounce or more. No indications remain from which to judge of the length of arrow-shafts, excepting that an ounce head flies well with a feathered shaft of 26 inches; but the early hunters no doubt reduced this length to a minimum, say 12 to 16 inches, for convenience of carrying in the belt.

The figures 37 to 59, inclusive, will convey an idea of the forms, but not in all cases of the actual size, of the usual types of arrows. Without occupying space

by specifying where each was obtained, the outlines are all from existing specimens in flint or other stone.

Whether at any period the European men of the stone age did or did not poison their arrows, is one of several questions in early archæology that is left open to conjecture. Unfortunately there is little possibility of bringing it to absolute proof. No data exists on which to base an affirmative opinion; and on the other hand no negative evidence can be adduced that would justify saying they did not. At all events, any vegetable or animal poison,—even the famed wourali venom investigated by Mr. Waterton,—would have become innocuous through lapse of time, leaving little possibility of tracing it. The ordinary large size of average flint and other arrow-heads would militate against the supposition of their having been envenomed, although it is more than probable that the effects of several poisonous substances were known. The users of stone projectiles, always living in the open air, would necessarily become more or less conversant with the malign properties of plants and gums, as well as with the deadly qualities that render putrescent flesh and certain reptiles adverse to life. An idea that the use of these poisons would render themselves more formidable would not be unnatural, although it was likely long in taking practical effect, if it ever did. Nevertheless, the record of most modern savage tribes of which we have knowledge outside of Europe shows that the use of poison-bearing arms was habitual in some period of their history. Here again the size of arrow-heads lends a faint indication towards a solution of the question, for

FIGS. 37 to 59. Mound-builders' arrows, full size.

the smaller the missile the more likelihood of its being envenomed, even if so small as a chip of bone blown through a hollow reed. Some interesting specimens from the Dalles on the Columbia river, Oregon Territory, U.S., and now in the writer's collection, are engraved (*ante*) of full size. So small are some of them, yet so admirably chipped are these relics of an unknown race—presumably the mound-builders—that the uninitiated are disposed to regard them as mere toys for a doll's house, and manufactured by metal tools. Some have supposed them to be votive offerings, but the strong probability is that they were real projectiles, once poisoned, and may have been blown from a tube, but more likely, although so light, shot from weighted arrow-shafts. Many are of obsidian, the smaller ones weighing about 4 to 7 grains. Unfortunately the precise locality where found is not obtainable, excepting that they are brought in by Indians, who say that they are uncovered on the plains by sand-storms. The manufacture of such specimens is quite beyond the skill of the alleged finders. The Indians themselves profess to know nothing of them excepting there is a tradition that a "squaw" of immense age had said she had heard that the fathers had said that they were split by being heated and suddenly chilled. This would not, however, account for the beautiful delicacy of the chipping. It is observable that these tiny bolts are fashioned in most of the characteristic shapes of the larger arrows of flint and other stone in Europe.

CHAPTER X.

NEWER STONE AGE (*continued*).

Implements of Domestic Use.

Similar in both Ages of Stone.—Knives for Cutting and Flaying.—Gouges and Chisels.—Pickers and Boring Tools.—Saws and Wool-combs.—Whetstones, Slickstones.—Weights and Sinkers.—Bracers.—Griddles.—Certain small Wheels may have been Spinning-tops.—Perforated Discs.—Mortars.—Mills.—So-called Spindles and Whorls.—Art of Weaving not known in either Stone Age.—Fishing Nets.—Manufactures in Bone.

As a few rude implements of flint filled all the requirements of the men of the Older Stone Age,—of which specimens have been unearthed from the river-drifts and from beneath the floor of caves,—so similar articles continued to be the sole domestic appliances, without much improvement, during the earlier part of the Newer Age. These seem to have been for a long time so alike as to be almost identical. The list of articles is brief; namely, flakes longer or shorter, split from pebbles and going by the names of knives, "fabricators," or by other terms according to use; flat pieces of flint of a few inches in superficies, and with one edge sharp, known as scrapers or skinning tools; sharp-pointed splinters of flint, spoken of as borers, awls, drills, or augers (the last name mis-

leading), for boring eyelet-holes in skins or articles of bone; chisels and gouges, so called, which were but flint flakes straight-edged or grooved at one end; and flat serrated pieces of flint, known as saws, and fairly well answering that purpose. With this limited outfit constructive industry was carried on, the sharp stone axe, of many uses, supplying all deficiencies. In addition to the implements named were several minor articles of stone, or of bone as its substitute. Towards the end of the age grinding and baking stones appear, showing the making of bread, but not of cultivated grain, agriculture not having been practised until the age we call of bronze. Even when advancement had produced improvement in domestic implements, it was rather in workmanship than in kind. When small pieces of rough flint such as above described were the only working implements, badly baked clay vessels the sole cooking utensils, with no acquaintance with woodwork or furniture, the social condition of the race continued on a low level during the greater length of the stone age; but from the number of small and more flexible skins captured by bow and arrow, and from quantities of scrapers for preparing them, and a few eyed needles that have been found for sewing them, marked improvement as the age advanced may be fancied in dress, by the substitution of skins dressed like chamois leather and stitched, instead of rigid blankets of hide. Improvements in cookery, too, are manifest from the grinding and baking stones by which bread like Scotch oatcake was made. When persons have become accustomed to improvement in their domestic arrangements,

the tendency is never backward, but onward. By the time perforated axes and tools had become common domestic wants, the means of supplying them had much increased,—while no doubt their habitations had improved,—and the people must have attained to a limited degree of rude comfort, although their domestic aids were still clumsy and few. Brief notice of these implements will suffice.

In fracturing nodules of flint to be chipped into celts, a number of splinters would be struck off. Without any further dressing some of them were sharp enough to be used as knives or as common arrow-heads, or for scraping wood or bone, as glass is used by carpenters for scraping surfaces smooth. Some may have been fitted with a handle at one end, or at both ends in the manner of a spoke-shave. Such splinters are spoken of as "flakes," or when partially formed by chipping or grinding as "dressed flakes." From marks of wear observed on the edge of some of them, it is seen they have been made use of for striking fire from iron pyrites. Flakes, not the waste of celts but intentionally struck off from blocks, are usually five inches and upwards in length, with a clean fracture, and could be used for knives without any secondary chipping. A large proportion of those found in Britain, with edges ground, are from the Yorkshire wolds. Curved flakes are less common than straight, but they too are available as knives. It has been assumed that these curved blades were sickles; but the infrequent opportunities that the early race could have had for the gathering of crops would scarcely demand a special in-

strument prepared for the purpose. Besides, the usually short length of a flint flake would not be well adapted for the cutting stroke by which a sickle is operated.

Scrapers (*grattoirs*) are hand implements, generally of flint, used in flaying and in cutting away fragments of flesh from hides. Some in appearance resemble imperfect

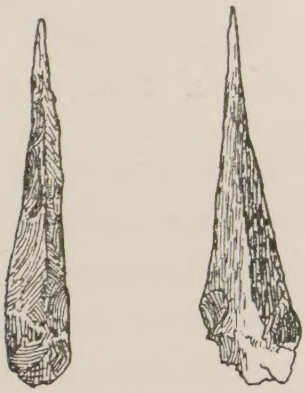
Fig. 60. Chisel.

celts, and generally approach in shape to an oyster shell. Scrapers are more appropriately called "skinning knives." The colloquial division of dressed flints as "finger flints" and "thumb flints" is not necessary. They occur over the whole of Britain, also in Denmark, Belgium, and the north of France. Gouges are flakes with a natural or worked groove at one end, for the same use as a modern

tool of the same name. They were no doubt used in hollowing troughs, log boats, and other excavated articles. A short-hafted celt, as a gouge on a larger scale, would be a serviceable tool for such work. Chisels are the same tool, not grooved, and cut at one end to a chisel

Fig. 61. Borer.

edge. They were used either in the hand or inserted in a haft. The use of both chisels and gouges was mainly to work in wood. Pickers were but chisels with a more acute point, which, skilfully tapped with a hammer, were employed to roughen the grasp of hand tools, as also to



Figs. 62, 63. Awls, flint.

start the indentation for the boring of axes in the later time of the polished stone period.

Boring tools are classified according to their size, as borers, awls, and drills (figs. 61 to 64). The material of all is the same; namely, angles, splinters, or spiculæ of

FIG. 64. Borer, flint.

flint. Awls and drills were operated by rotating the tool in a half-circle by the hand, although a drill might be set in action by a coiled string or spring-bow as a multiplying power, for example by an ordinary bowstring. By the latter means eyes of bone needles, still extant, and teeth of animals have been pierced. Many occasions

might occur where the larger implement (fig. 64) would be useful, as in boat-building or other work requiring to be fastened with pegs, sockets for tool-handles in wood or horn, and for a variety of other purposes. Awls would be required in stitching hide, clothing of skins, and the like, and might also be resorted to in boring holes in the

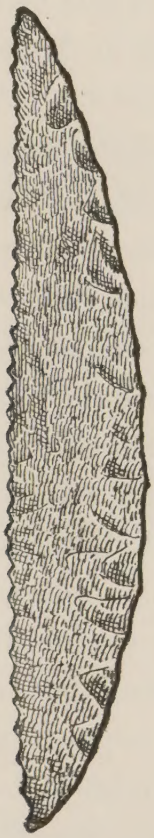


Fig. 65. Saw, flint.

wood of bows, in which to fit the string. The name of "augers," given by some writers to flint boring tools, is inappropriate. Another use for slender, needle-like splinters of flint may have been as fishing hooks, fastened at an angle to a piece of wood or string.

A considerable number of flat knives of flint have been found with the edges intentionally and regularly serrated, thus converting them into saws. The convenience of such implements is manifest. Without the aid of a saw, it is difficult to see how the hard substance of an antler could be neatly divided. A good many have been found on the Yorkshire wolds, a few in France, but as yet none, that we have heard of, in Ireland. A few have been taken from kitchen middens. A thin sharp flake accidentally notched irregularly would be almost as efficient as one designedly toothed. Whetstones are merely irregular pieces of sandstone on which other stones were sharpened. In later times they were perforated with an eyelet hole, so as to be suspended from the person or in the work place. They would be also used for filing bone pins to a point and in smoothing arrow-shafts. Deeply serrated saws go by the name of "combs," most frequently formed of bone. Their use was the smoothing of furs, and it by no means implies, as some have supposed, a knowledge of the preparation of fibre for weaving.

Celts might have been put to the same uses as a hammer, although the exposed grain of the stone rendered it brittle and liable to fracture. Hard round pebbles of various weights therefore did duty as tapping hammers, and are often only known as hammers from having been found in proximity with other relics. Where practicable, they were selected with a depression on one or both sides, to secure the grasp of the hand, which depression allies them to hollowed "mortar" stones, in which substances were rubbed with a blunt stone for a

pestle. Many of these mortar stones exist. Stones of various weights, with a groove cut around to anchor them as "sinkers"; stones of any shape but of some weight and with one side smooth, known as "slick-stones," for pressing seams in stitching; "sling-stones," or stones dressed as missiles for hand-slings,—although we have elsewhere pointed out that flints would not be carefully fashioned for slings when every pebble would

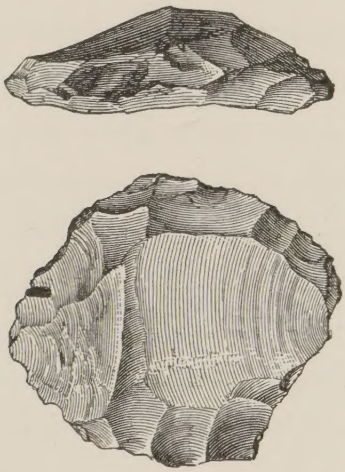


FIG. 66. Sling-stone, flint.

do as well,—and stones that have been called "weights" because their use is not apparent, were all among early manufactures in stone.

Other stone implements of which the purposes are not so readily determined have been found in considerable number. The first is known as "bracer," a thin quadrangular plat of hard stone from six to eight inches in greatest length, slightly hollowed lengthways and perforated at each end with two or four holes about large enough to admit a bass fiddlestring. A fanciful opinion

has been advanced, that this is the shell of a stringed musical instrument. Another view is, that it was for keeping the strands separate in the twisting of fishing-lines; and yet another surmise is, that the bracer was a guard for the wrist in archery, although it is hard to see why it should be made of stone when leather would answer the purpose better. A recent essay considers these "bracers" were breastplates. Probably their true use has yet to be ascertained.

Flat circular discs of stone, of six to nine inches or other diameter, have been found chiefly in Orkney and Shetland. These may have been covers for pots, also "griddles" on which to bake as oatcake is baked. Similar discs are used by American Indians in playing quoits. Here let us say that, in estimating early man, too little weight is given to the fact that amusement forms a feature in savage life. Modern savages recreate themselves by athletic feats, quoits and ball, shooting displays and the like, and have tribal or lesser contests as our parishes and elevens have. Boys, too, are boys all the world over, in whatever degree of civilization or savagery; so we find Indian lads making and competing with lesser bows and arrows, or carving toys, while the girls nurse dolls and play at tent-keeping. Hence certain small wheels that have been called whorls for weaving may be nothing more dignified than spinning-tops, or perhaps may have been appended to fishing-reels.

Mills for grinding do not by any means presuppose any preliminary process of agriculture. On the contrary, grain is but one of many products that may be ground

into a species of flour for bread, for the earth produces spontaneously many kinds of breadstuffs for human food. Almost all the grasses produce edible kernels. At the present day there are aborigines in Canada who find a great aid to their winter store in wild rice (*zizania aquatica*). Pulse, nuts, acorns, and the seeds of trees and shrubs, the roasted bark of certain deciduous trees, as well as dried roots and fruits, are all bread-making materials. A hand-mill would therefore be in every family when the race ceased to be wholly carnivorous. A form of "mealing stone," consisting of a hollowed bed in which sub-

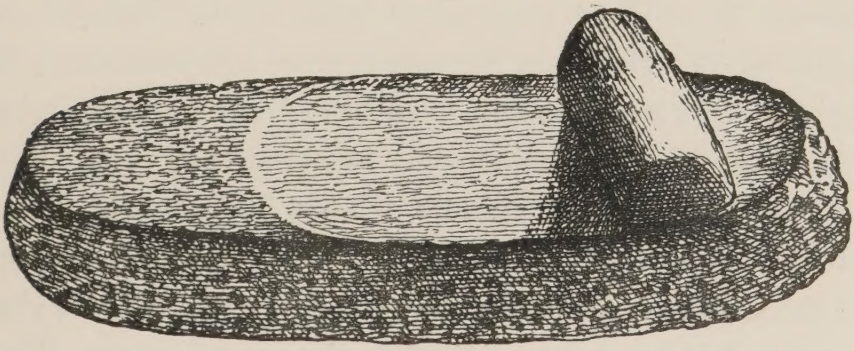


Fig. 67. Mealing stones.

stances were crushed by rolling a heavy muller of stone, is a common relic throughout the three kingdoms, as also in France and Germany (fig. 67). The name of "saddle-quern" has been given it. An advance on this form is the more modern hand-mill, or quern proper, in which the principle is the same. We should be inclined to consider rotatory hand-mills as not much antedating the beginning of history. Circular millstones have been found in various parts of Britain, but they cannot be of high antiquity.

A not uncommon error with some investigators is, to be too ingenious in devising uses for implements the purpose of which is not quite apparent. It is forgotten that a savage is very "make-shift" in his operations. Where a chance stone picked up from the ground would serve as a weight for his loom (if he had one), it would never occur to him to frame a perforated disc for the purpose. It is therefore more reasonable to assign an unknown implement to some industry that is known to have been pursued than to devise from the doubtful implement some new industry. We have already offered a semi-jocose surmise, that if certain small wheels, the largest not exceeding two inches in diameter, were not used in spinning fishing-lines, they may even have been spinning-tops; but it has been rather definitely asserted they could have been nothing else but spindle whorls for stretching the web of textile fabrics. Now this assertion is based on the gratuitous assumption that the spinning and weaving of textile fabrics was practised in the age of stone. Two or three almost undecipherable fragments of matted wool, claimed to be cloth from a British tumulus, are not sufficient weight of evidence from which to adjudge that the custom of wearing woven woollens was general. The assumption is surely too ingenious. Without doubt it is to the tropics we must look for the invention of weaving at no extremely remote period. Ostentation, and not necessity, would induce it. The oldest Egyptian monuments exhibit the loom, while the most antique northern traditions speak of robes of hide, like Scotch plaids clasped by fibulæ, as being in use as late as the

metallic age. Therefore a costume, like the transatlantic hunters', of dressed skin may be assumed to have been the customary dress of the race in Europe, until the use of metals gave a spur to new wants and introduced cloth, which, after all, was not a want and would be but a luxury, or rather a *fashion.*

Some remarks are here pertinent on the subject of implements of bone. These appear to have been known both in the Older and Newer Stone Age, and to have been about the earliest of man's manufactures. Nor could this well have been otherwise. From the circumstance that the bones of the large mammalia found within the haunts of earlier man are usually found cracked across and gnawed, marrow seems to have been regarded as a *bonne bouche.* In cracking large bones to get at the marrow, sharp splinters must often have been struck off, that without more preparation might be made to serve as knives and the like. These had the advantage over stone of being lighter, and, in reality, less brittle. Besides, bone could be readily sawn and dressed by flint instruments. In the Newer age it is somewhat strange that so few arrow-heads of bone have been found, suitable as the material is for that purpose. It is, however, so much more perishable than stone, that most of the implements from it may have passed out of existence. Nevertheless, in a barrow in Wilts thirty specimens of articles of bone were together, including spear-heads in length from three to nine inches, and formed of the leg bones of animals. Other similar specimens from the Thames and from Lincolnshire are in the British Museum. Bone bodkins and

needles with eyes have been found in various places, also netting needles and gauges for nets. Buttons and clasps, of uncertain date, are among the relics of useful bone manufacture. Purely ornamental articles are treated of in our Chapter on Art.

CHAPTER XI.

KITCHEN MIDDENS.

Shell-mounds along Beaches.—Beach-feasts universal.—In Denmark.—Britain.—In America.—Explorations of Kitchen Middens.—Relics found.—Wholly of the Non-metallic Age.—Fauna of the Period.—Boats.—Shell-fishing.—No Human Remains found in European Middens.—Supposed Race that held the Shell-feasts.—American Midden-makers Cannibals, but European not.—Age of the Middens.

In the progress of archæological research, an interesting discovery was made; namely, that great banks of shells along certain sea-beaches, which it was always supposed had been washed up by the sea, had been deposited, shell by shell, by human hands. The watchful eye of science was first attracted by noticing that the shells lay without stratification, and were all of mature size without any admixture of smaller ones, which facts would not have been so had the heaps been deposited by the wash of the waves. Investigation of these shell-mounds, revealing lost flint implements, blackened hearthstones, and fragments of pottery, gave indication that man had lived there and had cast up the mounds.

These heaps of shells are known by the name of "kitchen middens," from the Danish word *kjökken-*

möddings, or refuse of kitchens. They are found in many parts of the world, both in Europe and America, but have been chiefly investigated on the Baltic, there being several of large size on the peninsula of Jutland. Along the beaches of the Danish Islands, Devon, Cornwall, and Scotland, also in North America from Newfoundland to the Gulf of Florida, and on the Pacific, similar heaps have been casually observed. Some of them in Denmark are about 1,000 feet in length by 200 in width, and 3 to 10 feet in depth. They are wholly composed of oyster-shells, or nearly so, the other remains intermixed being mussel, cockle, and periwinkle shells, with bones of cod, herring, flounder, and eel, with frequent remains of seal and porpoise. It is among these that flint implements have been found, but no human bones. The mounds unmistakably show that the men of the time were gregarious, and, in considerable bodies, had periodically to depend on the sea and the mollusc-bearing beaches for a portion of their food supply.

Writers on the aborigines of North America use the expressions "land or prairie Indians" and "shore Indians" somewhat loosely, the latter really meaning, not persons who live absolutely on the sea-shore, but tribes that occupy the country nearest to the sea, in contradistinction to those whose "nations" lie in the interior. Although each of these tribes, or group of tribes, claimed and held a certain extent of the land, they were more or less nomadic within that limit. Their main occupation, like that of all savages, was hunting land animals; but at certain seasons of the year the bulk of the

"shore" population gravitated towards the sea, partly for a change of fresh fish food, and again to catch and dry a supply of fish to serve them in winter when moorland game would be scarce. As long as these fishing localities remained productive they would have no occasion to seek new ones, but would return year after year to the same stretch of beach, leaving traces of their sojourn in mounds of shells. The question has been discussed whether the men who raised the European heaps lived permanently on the beaches or only visited them at stated times? From careful comparison of the bones of land animals found in the American heaps,—too long a process of reasoning to be here detailed,—the conclusion seems plausible that large detachments from the shore tribes visited the beaches in spring for an indulgence in fish diet soon after the breaking up of the ice, and again in late autumn when cod and other sea-fish could be caught and dried on the beach for the coming winter, as is done in modern stock-fisheries. Similar habits on the American and European coasts may give a key to the reading of the European kitchen middens.

Although the principal products of kitchen middens are mainly of marine origin, bones of land animals, though comparatively few in the European shell-heaps, are not wanting. Relics of stag, roe, wild boar, and urus are recognisable, as also of wolf, fox, wild cat, beaver, marten, hedgehog, and water rat. The absence of all traces of the reindeer would place the date of these middens as anterior to the migration of that animal to

the North. Vestiges of the horse and great elk are also awanting, and nothing has been discovered to indicate that the time was contemporary with the mastodon.

Among the fragments of bones said to have been identified are some supposed to have been those of the dog. It would be well to adopt this supposition with caution, it being all but established that dogs were not domesticated as the friends of man until far in the bronze age; and the shell-heaps show clearly that they date from non-metallic times. Apart from the comparatively few remains on which to found a judgment, there is difficulty in distinguishing the bones of the dog from those of the wolf. The question of the subjugation of animals now domesticated to the service of man is discussed in another chapter, and the conclusion arrived at is, that the supposed canine remains cannot be those of the domestic dog as we now know it in its relations to man. Likelihood, however, is in favour of the relics being the bones of a small species of wolf, semi-tamed, and following the camp as untamed jackals haunt around encampments in the East. The fact that these supposed bones of dogs are cracked across to get at the marrow, in the same way as are the bones of other animals used as food, shows that the canine animal, whatever it may have been, was eaten, which would scarcely have been the case with domestic dogs, when it was evident fish food was abundant and flesh from the chase presumably so. Among many bones of aquatic birds have been detected those of wild geese, ducks, gulls, and swans, and some supposed to be those of the great auk,—which they

probably were. No arrow-heads by which winged game could be shot have been found (another index to the date of the heaps). The birds were no doubt killed with sling-stones.

These visitors to the shore could not have accomplished the object of their mission without boats. Equally impossible that they could all have dragged with them, through a forest country without roads, heavy boats of hollowed logs requiring the muscular strength of three or four men to move them along land. Not more likely that a fleet was hollowed on the spot. It is true that some of the visitors might come to the rendezvous in such boats by water, but not from inland. Boats of this description have been found intact in peat mosses, but show no necessary connection with kitchen middens. A light coracle of the Esquimaux type, the skin of which could be easily carried on a journey, would answer the purpose of fishing molluscs. Live oyster beds vary in depth beneath the surface from low-water mark to two or three fathoms or more. To reach this pavement of edibles would not be difficult, not by the toilsome method of dredging as practised in England, but by the American implement of "oyster-tongs," the construction of which useful instrument is not beyond the intelligence of a savage. Two wooden rakes, such as used by haymakers, are constructed with long slender shafts and teeth long and curved. Tines of deerhorn would do well for teeth. The two shafts being connected by a pin, they act on the principle of a pair of tongs for lifting oysters from the bed. Most of the supply from the oyster fisheries of

the maritime provinces of Canada is collected by this implement.

The handiworks of man himself yet found in the kitchen middens are few, chiefly flint celts, roughly chipped, and flake-knives and scrapers, with fragments of pottery. One form of celt so generally prevails that it is known as the "kitchen midden axe." An outline of its form is given in fig. 21. A few spear-heads and even a very few celts, ground and polished, have been found; but from the inconsistency of finding manufactures of a late age there, it is reasonable to suppose that these polished weapons were lost by parties visiting the beach after the heaps were made. The fragments of pottery are of very inferior workmanship, of untempered clay mixed with pounded shells, and seem to have come from vessels of a circular shape.

The question has not been settled whether the race that has left its memorials in the shell-heaps of Europe permanently lived on the coast, or, what is more probable, made periodical migrations there. In the latter case, it is difficult to decide what induced large bodies of people, in numbers to fringe the shore, to gather towards the sea at stated times. It must have been the subject of previous arrangement. Whether it were scarcity in early spring caused migration to the beach for fish food, or if in autumn to lay in supplies of dried fish for winter, the trait in the life of early mankind is curious. Bones of land animals found in the middens would imply that it was not want; for when so much game as the relics show could be taken on the shore, the supply would be

abundant inland. And further, when we know how low the grade of intellect was among early men, and that their lives were passed in alternations of torpid indolence and violent physical strain, and yet again, from the absence of anything in the mounds that would show sacrificial ceremonies, the idea is precluded that the tribes could have assembled by the sea for the observance of religious rites. Cannibalism among the American shell-heap makers is placed beyond a doubt, human bones, both in Florida and Maine, having been found fractured along with bones of other animals, to extract the marrow. Suspicion of a like practice whispered against certain cave-dwellers in Europe, may require clearer proof than yet exists. The European midden-builders are not charged with the practice. Nothing is known of how the makers of the middens disposed of their dead. Ethnologists have ingeniously reasoned from certain rounded human skulls of small size, with a receating forehead and much protuberance above the eyes, found in Danish tumuli (near middens), that the participators in these shell-feasts were a race in physical features resembling Laplanders.

Respecting the age of the middens, says the Marquis of Nadaillac, in speaking of those of America, "in regard to the age of the shell-heaps, the day has not yet come for expressing a definite opinion. It is certain many of them are of great antiquity, and that additions continued to be made to some of them up to a very recent date." The remark of being added to up to a recent date does not appear to be applicable to Europe,

but may be to America, where, until recently, were roving tribes who might still have indulged in shell-feasts. From the circumstance that Danish middens so far as explored have produced no palæolithic implements, but do produce celts, of a rude type peculiar to themselves, but still celts, and that all the implements are of flint, one has fair ground for an opinion that the date of the European middens is later than the close of the palæolithic age, and may be set down as of the early period of the neolithic.

CHAPTER XII.

MOUND-BUILDERS.

Who were the Mound-builders of America?—Great Extent of their Earth-works.—Erected against an ever-present Danger.—Ground Plans.—Their Arms of Flint and Copper.—A Timid and Quiet People.—Cultivated Herb Gardens.—Excelled in Pottery.—Worked in Copper before the Bronze Age in Europe.—Were gradually driven South.—Graves.—Their Religion not obtrusive.—Their Date doubtful.—Similar in Civilization to the Swiss Lake-dwellers.

A POPULAR treatise on Early Archæology cannot omit all notice of an interesting but vanished American race known as the Mound-builders.

Not much longer than a lifetime ago, that present portion of the United States of America lying west of the great river Mississippi was uninhabited by settlers, and only thought of as the Wild West, the home of savagery. The first white men who penetrated into the unexplored country for the purpose of trading with, or robbing, the Indians, were ruffians of a type as brutal as the savages themselves. Such were not the persons to take notice of the features of a country. When these rough pioneers were followed by an immigration of "squatters" (unauthorized settlers) to pre-empt lands, they noticed that in many places were long regular ridges

covered with grass or trees; but, if thought of at all, these were set down to the natural configuration of the territory. At length, when Government appropriated and surveyed the lands, these ridges were found to be artificial earthworks erected by a lost people who had possessed walled towns. The attention of science being turned to the subject, plans of the mounds were published by learned bodies, and the Mound-builders became an important feature in American ethnology.

The remarkable works that have given to a vanished race a descriptive name lie chiefly between the Alleghany and Rocky Mountains, from south of the great northern lakes to Florida and Texas, where they are lost in the archæological remains of tropic America. What is now the State of Ohio seems to have been the centre of population. Scattered as the detached mounds are over half the North American continent, they evidently preserve a co-relation with each other. The works consist of walled forts constructed of earth, and ranging from a few feet to a thousand in diameter, and from four or five to fifty feet in height even after centuries of vertical denudation. Inside of the surrounding wall the houses of the town were placed without regularity, as is still traced from blackened hearthstones and circular foundation trenches. The dwellings seem to have been beehive in shape, wattled and plastered with clay. At a little distance from the inhabited part the dead were placed in a recumbent position in a circular tumulus of earth. Cremation was also practised. On the subject of their burial, see Chapter XVII. on Sepulture.

So extensive a system of earthworks could not have been constructed in face of a sudden invasion, but must have been prepared as a defence against an ever-present danger. Exponents of the ground-plans seek to show that all the lines are part of one system of defence *facing the north*. This is not by any means at variance with probability. Existing Indians of the western American plains have still vague remnants of tradition that their ancestors came from that quarter of the compass. The tide of conquest always flows from the north. Given a southern people comparatively settled, so far advanced as to employ themselves in pursuits partly agricultural and therefore possessing a rude plenty, the temptation to fierce nomads from a rugged clime would be irresistible. It has always been so under like circumstances. When forays were first begun, they would be made by a few dozen or scores of some exceptionally predatory clan, who, getting clear off with their booty, would repeat the operation (next harvest-time, perhaps), and the enterprise would be followed by larger bodies of invaders. All Indians palisade their villages, therefore it would be no new idea in the sufferers to erect defences and rallying points against anticipated irruptions. This would be quite within the resources of the population, if numerous on an exposed border. No doubt the expected invasions came, again and again, driving in the first lines and necessitating the erection of others behind them, further south. It has been calculated that the lengths of wall in the present State of Ohio alone, if added together, would reach nearly three hundred miles. This could not

have been the work of a day. Rather, it would show a state of warfare foreboded over generations. Writers of monographs have arranged the records into mounds of defence, of burial, and of religious rite—the last named being doubtful.

An examination of the ground plan of many of these defences discloses a certain degree of acquaintance with sound principles of castramentation. The site is usually chosen with judgment at the juncture of two rivers commanding both. Some of the most flourishing cities of western America now occupy these sites; St. Louis, for instance, is still known as "Mound City." Other artificial ridges crown eminences; and it is observed that these hill-forts are never commanded by any higher ground. When on the plain, the outer line is protected by outworks, so as to cover the body of the camp or citadel of the place beyond the reach of arrow flight, and along the line of face in some of the more elaborate forts are buttresses, that might have served for bastions placed at regular intervals. The lines were regularly ditched *within* the walls, and wells were sunk in the enclosure. It cannot be traced that these plans were derived from any old-world system of fortification of any date. Besides those which may be called the regular lines, others are traced of fanciful shapes, no doubt erected in some piping time of peace. One of these has been named "the mastodon fort," from a supposition that it represented, or embodied a tradition of, that giant beast. The fact itself is curious, for no remains of the large extinct mammalia have been found within the

mound-builders' camps, consequently it is unlikely that they were contemporary. Other outlines yet more whimsical have been traced in which discoverers have puzzled themselves to interpret the design. Doubtless they were architectural crotchets ("follies"), without latent significance.

Petty agriculture certainly formed part of the regular employment of the people, each family growing (probably on a general allotment) a portion of vegetable food for its own use. This is sufficiently proved by the existence of ancient terraces of prepared soil, still known by the local name of "garden beds." As these people of course grew no surplus for export, kitchen-gardening would be a more appropriate term than agriculture. Nothing indicates that they kept domestic animals. Indeed, the supply of bones for examination is but scanty. We miss the readings of the bone heaps found in the caves of Europe. There is no doubt that boats were common, whether hollowed logs or of lighter make is uncertain, but more likely the former. Statements have been made, but require verification, that the course of an artificial canal can be traced in the State of Missouri.

Bronze and iron were alike unknown to the mound-builders. The few implements of stone that tell of their habits must have been manufactured in the usual way by the aid of other stones. Magazines of spear and arrow heads, unearthed within some of the enclosures, show an acquaintance with the use of the bow. Notice is taken of one dagger of flint eighteen inches long, and several of obsidian of lesser size. Several specimens have

been found of an implement of unknown use, usually of serpentine, about eighteen inches in length, polished, which may have been a dagger of ceremony,—perhaps religious (fig. 68). A few serpentine celts resembling in shape those of Europe have been obtained. From the number of sharp flakes of obsidian found in graves, the

Fig. 68. Implement of ceremony.

mound men may have possessed a weapon similar to the Mexican mahquahwitl, made by inserting sharp obsidian teeth in a club of hardwood used with both hands, and which Spanish writers say was formidable (fig. 70). Besides these stone implements are barbed darts, not of large size, knives, borers, and fishhooks. Published accounts that we have seen are mostly imperfect for

comparison, the weights and dimensions not being given. The shapes of arrows known to the mound-builders are shown in figs. 37 to 59.

An interesting feature in the record of the race who built the mounds is that they worked in copper. Crude ore would be found in many places of the district they occupied, and an ample supply could be obtained by direct working or by barter from the almost inexhaustible deposits of Lake Superior, where prehistoric mining was

Fig. 69. Ornaments of copper.

carried on largely. Their metal work was done wholly by hammering, not by casting. Indications would show that the ore having been pulverized and roasted, the irregular streaks of metal were cut into size for the article required, and then finished into shape by beating. Beads, for example, were not cast in rotund form, but were made of small ribbons of copper rolled tightly into globular or pipe form. A stone mould for coppersmith's use, found in one of the settlements, shows from traces

known to experts that the metal had not been fused, but had been beaten into the mould till it took the required shape. Of the smaller articles, knives, shears, scrapers, awls, and articles of personal adornment were made of copper. Some ornaments in the shape of tortoises, about two inches in length and manufactured from a sheet as thin as a wafer, were found (fig. 69) packed in rabbit's wool and covered with leather as in a jewel case. Spear and arrow heads of excellent neatness and workmanship are found, of the same metal. Mound artificers excelled in the art of making pottery. Many specimens have been found, from the rudest to some that exceeds, both

Fig. 70. Obsidian mahquahwitl.

in design and execution, that produced in Europe in the same stage of social development (Chap. XV.). Large numbers of pipe heads of clay and stearite have been collected, many of them of grotesque human faces. To some of them we are indebted for an idea of the costume of the period, which seems to have resembled the existing hunting shirt, or rather the blouse of a French *ouvrier*, and belted at the waist. Mummies that have been discovered in burial mounds in the south-west show that coarse cloth of vegetable fibre was woven. Examination of mound skeletons does not disclose any marked difference either in average stature or cranial development

from the Indian races now occupying the district; and some specimens of portrait pottery represent countenances that might be seen in any crowd at the present day (Chap. XX.). While this page is being written, explorations are making at Fort Ancient, in Ohio, the largest of the mounds, for relics of the mound-builders to be exhibited at the coming World's Fair at Chicago.

As regards the religion of these people, a hierarchy is always contemporaneous with civil government, if indeed the terms are not too often synonymous. In studying work done by the collective labour of a people, we are in general safe to look for the religious object for which it was designed, or which underlies it; but these mound-builders seem to have been singularly devoid of any conspicuous shrines. The "altars," so called, were merely flat stones level with the ground, some of them of small size, others extending to fifty feet in length by fifteen in width. It has been surmised with much show of justice that the rite practised there was merely cremation of the dead. Small figures of baked clay that have been called "idols," found in the vicinity of these supposed altars, were more likely to have been votive offerings cast upon the pyre than objects of worship. In fact, no reliable symbols of a prevalent worship have been made apparent. The same remark, it will be noticed, applies to the human race generally in Europe in an equivalent neolithic era and similar stage of development, which fact is in a measure confirmatory of the theory that a race religion never obtains until perverted individual intelligence arises to lead it.

It is for ethnology to discover whether North America was peopled from the north *viâ* Behring's Straits and the Aleutian Islands, or whether an immigration came from the south by way of the Pacific islands, through tropic America, or by a route no longer existing. Suffice it that the continent became occupied by a population differing in density in different places, and in course of time broke into tribes, each feeling its way towards civilization more rapidly or more slowly. Locality must have had much to do in regulating the pace at which improvement was made. Where the struggle for subsistence was rugged and unceasing, habitude would make little effort to escape from the round of toil. On the other hand, where plenty permitted leisure, improvement would advance. The fact is illustrated more noticeably on the North American continent than in Europe, that in the early stages of the race ornamentation increases as we advance towards the south. Relics of the Canadian tribes struggling for a living in their dense forests show no ornamentation whatsoever, while the workmanship of cotemporary tribes of the South is overloaded with ornament. The difference may be traced even by the degrees of latitude. If we may assume that the northern continent of America was peopled from both north and south, the riddle of the mound-builders is read. The meeting of the two influxes took place in the region where we find the earthworks. A race of southern origin expanding northward, bringing with them their indolent temperament and their knowledge of building, led in

that region, the most fertile part of temperate North America, a comparatively peaceful life, employed partly in hunting the abundance of buffalo and partly in gardening, living moreover in large settlements and without any great excitement to keep their senses on the alert. The other section from the north, fierce and nomad, or nearly so, in their habits, would in time follow their instinct to extend towards the South. Midway the collision of the two bodies took place, and the weaker was driven back. This view is confirmed by the mounds in the South being evidently less ancient than those in the North, from which the doomed race had been driven back upon the tropic tribes from which they emerged, and with which they again amalgamated. The most reasonable conclusion is, that the mound-builders were not mysterious immigrants of higher civilization from beyond the sea. They were in reality not a foreign strain, merely a southern branch of the same race of red men that now occupy their place. Indian tradition supports this view of the case.

As to the date of these people, the rules by which attempts are made to assign an era to communities in Europe do not apply. The possession of copper by the builders does not make them necessarily coincident with the bronze age in Europe. Indications are rather that their manufactures in copper were earlier than European bronze. Something may be judged from their paucity of arms in metal. A warlike temperament awakens pride in the manufacture of weapons; but these were a people

sunk in the lethargy of plenty, and their best work never reached the excellence and enterprise with which the bronze age began. Their degree of civilization was about equal to that of the Swiss lake-dwellers, and we should be disinclined to allow them a higher antiquity.

CHAPTER XIII.

THE AGE OF BRONZE.

Difficult to define the Duration of this Age.—Ran into the Polished Stone and Iron Epochs.—Was the Shortest of the Three Ages.—Sources from which a Knowledge of it is derived.—No Intermediate Age of Copper.—Introduction of Copper Alloys.—Agriculture developed.—Horse, Dog, and Farm Animals domesticated; and the Foundations of Trade laid.—Tribal Relations established, tending to the Consolidation of Races.—Travelling Artificers. — They founded Centres of Industry and Marts for Barter.—The Weapons of the Period.—Axes, Spears, Arrows.—Invention of the Sword, when?—Horse Furniture.—Articles of Ornament.—Weaving practised.—Bronze Age the Threshold of Civilization.

During the whole of the Ages of Stone mankind had no knowledge of any smelted metal as a material for manufacture. The name of the "Stone Age" is therefore correctly applied; but the term the "Bronze Age," made use of to describe the whole industry of an era, is misleading. Not all artificers worked in bronze. Neither did the bronze age *succeed* the age of stone. There was no date on which the manufacture of stone ceased and bronze took its place. On the contrary, stone implements and arms continued to be made throughout the whole period usually spoken of as the bronze age, and until the

sudden rise of working in iron supplied implements of the newly-discovered metal so rapidly and cheaply that it was more easy to procure iron wares by barter than for individuals to manufacture them of stone. The iron age did succeed the bronze epoch, inasmuch as it extinguished it; but the bronze age did not succeed the stone age—it ran concomitant with it.

There were many reasons for this. In the case of individuals, it was not every savage who had any portable property of his own that he could offer in exchange for one of the new implements that he had seen or heard of. All his life the skill taught him by his fathers had sufficed to make implements of stone for his own requirements, and necessity compelled him to continue to do so. Besides, the places where the novel manufacture was carried on were inaccessible to the bulk of mankind. Even had men had in their hands an equivalent to barter, many of the would-be purchasers would have had to make journeys over the greater part of Europe to reach the founderies. Moreover, with so little intercommunication, news would travel but slowly, and there were no doubt multitudes who never heard that any material had been found to supersede flint. Thus it happened that two manufactures, of stone and metal, went on concomitantly but independent of each other, the latter gaining in popularity and the former losing. Stone-chipping produced no change in the life of the tribes that practised it. Metal-working, on the other hand, stirred up energy and attracted a permanent population towards the industrial settlements. Where men are gathered

together in one common pursuit there must ensue either improvement or deterioration; and in the association of bodies of the people for industry in metals, it was all improvement, producing a wider range of wants and more intelligence and resource to supply them. We follow therefore the fortunes of that portion of the race that worked in bronze. And first as to the length of time the bronze age is supposed to have lasted.

All evidence goes to show that of the three ages, stone, bronze, and iron, bronze was the least enduring in point of actual time. It was also the most important as being the transition link between savagery and partial civilization. Monsieur Marlot, a Swiss *savant*, carefully examined a cutting where a railway had cleft a hill of diluvium deposited by the river Tinière, a feeder of the Lake of Geneva, and found three well-defined strata respectively of Roman, bronze, and stone dates. From a calculation of the relative thicknesses of these strata, estimated from the shallowest as well as from the deepest part of their deposits, he would make the stone age to have covered from 4,700 to 10,000 years, and the bronze age to have lasted not less than 2,900 years, and at the utmost not more than 4,000. Many archæologists are inclined to adopt M. Marlot's views, but others think that too long a duration is assigned to the bronze epoch. Briefly it may be summed up that the bronze era was at its height about 4,000 years before the Christian era. Vast as this period seems when counted by years, reflection will not say that it was long wherein to have changed the condition of Europe from being covered with

thick forests, through the tangled footpaths of which savage hunters tracked the wild beasts on which they fed, to portions of it being dotted with populous and industrial settlements in communication with each other. Time had imperceptibly brought about a new world with new men in it.

The sources from which we derive information as to the bronze age are comparatively few, as contrasted with the time of the stone age, and (besides occasional "finds" of bronze workmanship in unlooked-for places) are chiefly articles found in tombs, lake, and palustrine settlements. Too much reliance has, however, been placed on a supposition that the life of dwellers on rafts on secluded lakes exactly resembled the current life of the bronze age. Such could not have been the case. Although not identical with the communities inland, yet so large a collection of contemporary metallic articles of daily use has not been found elsewhere than in the lakes of Switzerland to throw light on the stage of progress to which the people of the time had attained. As the initial chapter of unwritten bronze age history only began to open to us less than forty years ago, when the first lake discoveries were made, there may yet be much to learn of this somewhat obscure epoch. Palustrine lodges, or sites of ancient hamlets raised on piles above the level of marshes that may have once been water shallows, have likewise furnished a few relics, chiefly from the triangular plain formed by the rivers Po, Adda, and Rena, in Italy. These lodges were small, built for temporary occupation, whereas the lake settlements were populous and as

permanent as if they had been on *terra firma*. Occupying the same sites through generations, they must have had their own traditions and a settled groove of life; but, after all, they were merely a collection of village communities. The affairs of life among them must have moved in a dull, mechanical routine. No particularly startling incident could occur except alarm from lurking predatory bands, or rise or fall of the lake, accidental fires, or some incident in hunting or fishing. They seem to have been a patient, plodding people, without ambition to better themselves; and it is scarcely tenable that any considerable number of them were lured away to share in the activity of the time, and, returning, to inoculate the rest with advanced ideas. More likely they plodded on until driven out by some unknown invasion or unrecorded pestilence. That they were in possession of many bronze articles, not of their own manufacture, shows that they had traffic with some seat of industry on the mainland that sold its wares. Such petty tradings were on a small scale, but were still Commerce, awaiting only a larger field for expansion. Examination of the articles they purchased throws considerable light on the general progress of bronze manufacture, and the developments, agricultural, mechanical, and social, that the people at large eventually attained.

Firstly, with respect to agriculture and the domestication of farm animals, it will be remembered that, in a given locality, a supply of vegetable food would in time become a necessity in view of the falling off in game that was sure to follow permanent settlement and increase of

population. In this connection it would not escape the notice even of savages that, with the recurrence of autumn, plants that might be eaten dropped their ripened seed, and from the seeds thus self-sown a supply continued. It would be quite within the reach of a very limited intelligence to reason that, if the ripened seeds of such edible plants were dropped in places where none were, it would cause an additional supply of food plants to spring up. The point of reasoning thus reached seems trivial, but it changed the manners of the race when put in practice.

The first committal of seeds to the ground with the view of growing an additional supply of food therefrom was pregnant with results from other points of view. The selection of a site would be a matter of calculation, some sheltered spot near the existing place of residence. In time the rule would be reversed, and the habitations be built near the fields. At first the place selected would have to be cleared from a growth of grass and weeds, necessitating some implement of wood, which would, of course, perish when thrown aside. Further, the site would require to be enclosed, to protect it from the ravages of animals. Here we have assumption of title in land. In the beginning the experiment would be on the smallest scale, and might be made by some individual more enterprising than his fellows. Such a one might have obtained a few handsful of grain from some Eastern trader. The venture once successful would be eagerly followed by all to whom the result became known, and larger and larger spaces would be cultivated, presumably

in common, until vegetable fields became an important source of tribal food supply. An extension of culture would lead to the selection of stretches of "farm lands," around which the habitations of the common cultivators would cluster, and thus agricultural settlements arose. With the increase of cultivation, hunting would diminish. Communication between these embryo villages would take place, and recognised routes ("trails") be established between the populated parts of Europe. The impetus given to intelligence by intercommunication becomes speedily obvious; nor could continuous intercourse take place without quickening the germ of political relations, but which we need not here touch upon. Such was the condition of life in some parts of Europe when the discovery of working in metals was made. To the growing of grain or of other grasses having edible seeds the taming of animals to be used as food in a scarcity of game would succeed as a natural sequence.

To a person familiar with modern colonial "clearings" on the edge of forests, the domestication of grass-eating animals appears less wonderful than it would to one resident in a country where stock has been raised for generations by stud-book, and where farms are cultivated according to indentures of lease. Even in Scotland, where wild deer trespass on the mountain farms, one particular deer often comes to be known as resorting regularly for pasture, as if from prescriptive right. In Canadian clearings in like manner, particular animals sometimes drop their timidity and become semi-tame.

Young calves of the moose deer, that are occasionally found on the snow, if placed with cow calves will become as tame as they, and when grown will accompany the cows to graze in the forest paths, and return in the evening without desire to roam. Other animals that are willing to tame themselves might be mentioned from colonial experience. When growing crops had been once enclosed by early husbandmen, the capture of animals for domestication was easy. It was but to leave the enclosure open until stray animals had entered to steal, and then prevent egress. Nature itself and a little exercise of patience would do the rest, for the lower fauna do not have the same instinctive horror of man that they have of beasts of prey; on the contrary, some creatures seem to have a kind of curiosity in regard to man's surroundings. A wild deer will come and look down from a height with an expression more of interest than fear on a settlement below. From all of which it follows that no difficulty was experienced in bringing animals under domestication as soon as crops were grown. The order of domestication would be first deer, then animals of the ox tribe, which would be used as beasts of burden, and lastly the most useful of all, the horse. A litter of young wolves would account for the dog, which would not take long to develop into an assistant of the cattle-owners. The rude figure (fig. 71) from the mounting of a vase, is supposed to be about the earliest representation of the domestic dog. Although the figure is not very like a dog, it approaches somewhat to the fox-terrier; while in a rock-carving from Algeria,

of about the same date, the cur represented is clearly a turnspit. The circle in the same fig. with cows is from a small plaquet attached to a necklace. Slight as this evidence is, it shows that these animals had already been domesticated. Here, then, were all the appliances of agriculture in operation. Until altered circumstances demanded it, produce would be limited to the quantity required for supply of the local settlement. At a later time farm surplus would come into demand as an article of regular trade. A moment's reflection will show what a change this testifies in the general condition of man.

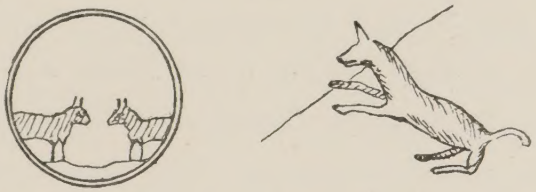


Fig. 71. Animals in bronze.

For how long this peaceable stream of patriarchal life flowed without a break, no data exist to show. Interruption to it from any cause would be but local. When a settlement became overcrowded by all the arable lands within reach being occupied, young men would move on and form new colonies. At all events it probably flowed smoothly enough until stirred into ripples by the exciting discovery of a new kind of industry; namely, collecting of ore and working in metals.

A feature of considerable significance here demands attention; to wit, that in America there was no bronze age, and in Europe no preliminary age of copper such as

existed among the American mound-builders. Manufactures in alloys of copper seem, from all evidence, to have sprung at once into existence in Europe, producing specimens of workmanship all with qualifying alloy of $\frac{1}{10}$th to $\frac{1}{14}$th per hundred of the main metal—an exactitude that could not have been reached by chance, but only by practical acquaintance with metallurgy, especially a knowledge of the qualities of ores other than cuprine. Those antiquarians, therefore, who assume that the discovery was developed in Asia in a stage of civilization superior to that of Europe, and brought by Phœnicians who came in ships to trade for their own supplies of copper and tin, may have hit the fact. That adventurers of the Tyrian coast built sea-going ships, which must have been fastened with copper bolts, in itself argues an acquaintance with practical metallurgy in the builders. Also that these Phœnicians were acquainted with the special article of bronze is not contradicted by any tangible proof. Why may they not then have introduced articles of bronze ready-made into Europe? Instead of the surmise, so hard to believe, that it occurred to some smelter of surface copper ore when hammering with a pebble on a rock for anvil, that an alloy of exactly one-tenth of tin would produce a new metal, and that the discovery spread with lightning rapidity, how much more easy of credence is it that the Phœnicians themselves supplied bronze implements complete, until at length they either confided the secret of the alloy or themselves set up forges in Europe to supply the increased demand? It is noticeable that great differ-

ence in skill of workmanship is seen in different articles of bronze. This may have been difference of ability in local artisans, or may distinguish imported from home-made wares. Be that as it may, it is impossible that in the absence of rapid modes of ordinary communication a knowledge of bronze could fly quickly over Europe. At the same time, men's minds once awakened to the discovery, it would spread increasingly. As not every man who could chip a pebble into a celt could forge one from metal, craftsmen, singly or in parties, would itinerate, working as they went wherever ore was supplied by customers or was discovered from surface indications. Such desultory work could not have been very productive in wares. The manifest inconveniences of the plan, especially in the collection and carriage of ores, would lead to permanent associations of workmen, and the establishment of depôts to which finders of ore could bring it to be worked. Vestiges of such smelting-works are yet to be traced in many places. From this centralization would further arise subdivision of labour into forgers and collectors of ore, also teamsters for conducting transport, for the horse either was then or soon would be used for carrying packs. Agriculturists not engaged in metallurgy would bestir themselves to provide food for the workmen in exchange for fabricated implements. Footpaths would expand into roads. Habitations for the men with their women and children would cluster around the works, and thus would be established industrial as well as agricultural communities. And lastly would spring up middlemen to distribute the pro-

ducts of industry, thus laying the foundations of trade. Assemblages of rude men could not be held together without some kind of subordination and discipline, nor unskilled hands be of use without being subjected to directors of labour. These labour settlements would at first resemble village communes. Eventually their aggregation grew into government. Now for the first time in the era of man was laid the basis of *society*. All this

Fig. 72. Bronze chisel.

arose from the sole fact of it having been discovered that certain metalliferous stones could be smelted and hammered.

As to domestic affairs, implements of house labour had become common. Bronze hammers, chisels, pincers, and (although we have no specimens) presumably saws and nails were in the hands of workmen, pointing clearly to construction in wood. Fig. 72 represents a chisel in

bronze, from which it will be seen that good tools—the essential for good workmanship—were appreciated. Nor did articles of utility alone occupy the bronze-smith's skill. Trinkets for personal adornment had a share of his attention. Fig. 73 shows a bracelet, or armlet,

Fig. 73. Bronze bracelet.

hammered and chiselled. Fig. 74, a bronze bangle for the ankle, is of less finished workmanship.

We have as yet said nothing of war. With the increase of food supply garnered by the agricultural settle-

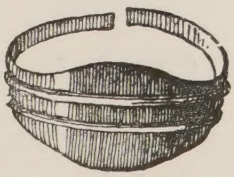


Fig. 74. Bronze bangle.

ments the risk would increase of predatory attacks from parties more warlike than industrious. Stores of food would excite the cupidity of foragers from other districts. Squabbles would readily grow into skirmishes, in which weapons would play their part, and therefore improved

arms of metal that might be purchased and paid for in kind would be in warm demand during the corn-raising and cattle-keeping period. Information as to these petty prehistoric contests can never reach us; but since history began to record human actions, it has but intensified the view that "the natural state of man is war." Hence the manufacture of arms seems to have been a main part of

Fig. 75. Common form of celt.

the bronze industry; but weapons did not show much improvement in pattern, being indeed but little more than reproductions in metal of the work of the polished stone period. Axes and spears were the most important. Hilted spear-heads or daggers were a part of common equipment. Arrow-heads of bronze, being too valuable to be shot carelessly away, and not answering the purpose better than stone, were little in use.

Among the arms of the period that have come down to us are a few celts cast in bronze from a stone model and in a stone mould. An early attempt at improvement was in beating the butt into a lappet to be welded round a handle, sometimes with a ring attached for a lashing, or with a small perforation for a locking bolt. These were no doubt made in the early part of the age, when the

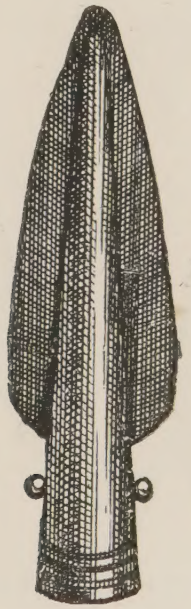


Fig. 76. Bronze javelin.

industry was young. This unhandy tool speedily improved into the cutting axe, which became the characteristic weapon of the age. Axes branched into many diversities of edge and weight. At first they were rudely made with a square socket-hole in the line of length of the butt, and were fitted on an elbowed shaft, which fitting might make them serviceable as adzes, but awkward when used as axes now are for a down-stroke.

Those from the Swiss lakes are of this construction. Later they were socketed for straight shafts, the socket adjusted to the balance of weight as they are now, perforated in the width. Danish battle-axes are superior weapons, double-edged, met with in museums, in size four to eight inches in length, with a weight of ten to fifteen pounds. Spear-heads, always made with sockets, bear evidence of careful work. They are in general slender, elongated, in compressed oval, almond, or lanceolate

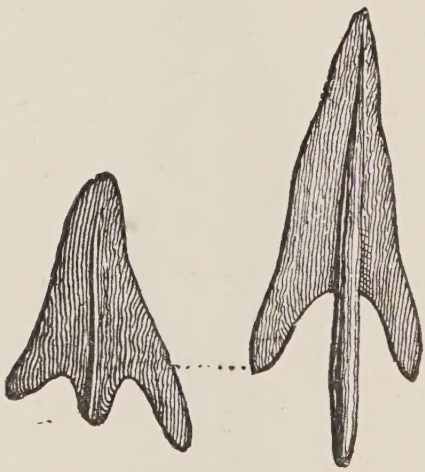


Fig. 77. Bronze arrow-heads, full size.

shape, always strengthened by a medial rib, and almost always devoid of ornamentation. Javelins, as shown in the illustration (fig. 76), were more robust and but carelessly finished, it not being considered necessary to expend labour on missiles that might be lost. They were fitted with a short heavy shaft, and frequently further secured by ligatures run through side loops. Flint arrow-heads continued the staple missile, those of bronze being always barbed and from one to two inches in

length. Daggers, of a foot, more or less, in length over all, show considerable taste and skill of structure; but it was in knives for other purposes that the greatest elaboration was used. Some of these show designs approaching the graceful. Fig. 78 represents a knife that might serve as a dagger, and was probably worn as such. The

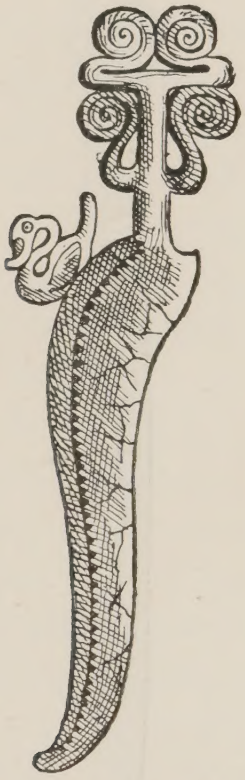


Fig. 78. Bronze knife, Denmark.

crude figure placed as a guard is apparently meant for the symbol of a swan.

Here comes into consideration the invention of the sword. It has been usual to speak of bronze swords of the bronze age. During that age, it is true, long knife blades sixteen inches in length, longer than could be con-

veniently worn in the girdle, were manufactured. Such a blade—a prolongation of the dagger—was a first step

Fig. 79. Bronze sword.

towards the invention of the sword, but was not the sword itself. There is indeed no evidence that these short blades were used in war at all. They could not

have been effective against a spear, and could not have turned the blow of an axe in close combat. Besides length (if not too long for perfect command of the weapon), two main virtues in a sword are flexibility and lightness. These qualities are awanting in bronze. A cutting and stabbing instrument shaped like a sword in bronze, even if short in length, would require to be made heavy so as to give it strength, else, when encountering any hard substance with a forcible blow, it would be apt to bend and be useless. When steel swords are forged, it is with care to combine strength with flexibility and lightness, so as to give scope for the play of the wrist, which is the leading secret of the swordsman's trade. Indeed, a short heavy blade is practically an axe with its edge prolonged, and could not become a favourite with warriors who trusted their lives to its qualities. We are inclined to believe that the sword as we now see it, with its finish and relative proportion of parts, was not reached until steel manufacture had made considerable advance; but it is admitted that the idea of it was in all likelihood taken from the long bronze knives of the bronze age. That many bronze swords were manufactured in the time of steel, is partly explainable on the ground that fighting-men would be at first chary in trying a new weapon of a new metal, and preferred, even in the early iron age, bronze as a material they were better acquainted with than with slighter arms of a metal as yet in a measure unproved. Bronze swords of more finished make may be set down to the later period of the bronze age, or rather to the transition stage

when tempered iron was fast superseding alloys of copper, and when we may suppose there was rivalry between artificers in the two metals in pushing their respective handiworks. The museum at Copenhagen contains several hundred bronze blades, of various lengths, which are worthy of careful study. We find no trace of defensive armour of bronze. Shields, if used, as they probably were, in combat against axes and javelins, would have been of hide protected with metal. Some massive discs, surmised to have been for harness, may have been bosses for shields. Denmark, Britain, and Ireland excelled in bronze manufactures, as latterly did the Scandinavians. Many interesting objects in bronze are in the British and Dublin Museums and the splendid collection at Copenhagen.

The art of weaving in the bronze age has been elsewhere alluded to. The body of a person of distinction found buried in a full suit of his wearing apparel, in a tomb in Jutland in 1861, enables us to form an idea of what the costume was in one period of this age. From the length of the bronze sword found with the remains, as well as several articles of adornment, the date of burial may be assigned rather to the early part of the iron age than to the bronze age proper.

We cannot pass without notice a supposition that has received a certain degree of encouragement, but seemingly from slight cause; namely, that the worship of the Sun was prevalent in the bronze age. In this surmise there seems little beyond hypothesis. It may be set down as accepted that no mythology, however crude, has existed

without leaving some visible symbol of its object or rites of adoration. Now none that can be considered such are traceable in the works of the bronze age, or that cannot be otherwise accounted for. Due weight must be given to the initial fact that the bronze-workers saw the sun rise almost every day of their lives. Neither had the sun of Europe the controlling effect it has on the surroundings of the people of the Orient. Had the glorious spectacle of sunrise been seen but once by an imaginative race, they could not but have exalted it into a manifestation of Deity. Familiarity from infancy would do away with all feeling of awe. It would be a continuous ordinary occurrence, seen every morning as they went to their workshops, and exciting no more worship than the breaking of waves on a beach. It is true that history tells later of peoples who did worship a Sun-god; but the statement is conjoined, that the rites of worship were directed by *priests of the Sun*, whereby our view, stated in another chapter, is corroborated, that race religions do not obtain until individual intelligence assumes to lead them. In absence, therefore, of relics that might be typical of religious observance, we see no clear way out of the conclusion that the world (or at least Europe) had reached this date in its prehistoric record without any prevailing mythology.

From this brief account of the manufactures and resources of the bronze age, so called, it will be seen how far in intellectual advance it was over the age even of polished stone. Association in labour was now the rule. Tribal relations had been gradually forming, and tribes

had partially affiliated into races, no doubt with their wars and appropriation of territory. The earth was cultivated to some extent. Ships had been built, and men armed with weapons of bronze ventured to put to sea in them on expeditions of trade or plunder. This necessarily implied subordination and chieftainship. Recognised commercial centres for barter of products had been established, on sites, in some instances, on which modern cities have been built. In a word, man was now standing on the threshold of civilization.

CHAPTER XIV.

LAKE-DWELLERS.

Discovery of Aquatic Dwellings in Swiss Lakes.—May have been at first Palustrine.—Similar Discoveries in Germany and Italy.—In Britain.—Plan of the Water Terraces.—The Habitations thereon.—Their Date.—Weapons and Implements of the Lake-Dwellers.—Were acquainted with Weaving; and with Petty Agriculture.—Had Domesticated Animals.—Their Fishing and Hunting.—Fauna of the Period.—Manner of Sepulture obscure.—Whence the Lake men came; and when disappeared.

For a generation or two, gossip had run along the shore frontage of the Canton of Zurich, in Switzerland, that a town lay beneath the waters of the lake. Similar legends are current in many parts of the world. At length, in the winter of 1853–4, the water in Lake Zurich fell unprecedentedly low, and so remained for a considerable time. Owners of fields and gardens on the shore, at Meilan, took the opportunity to erect dykes against the return of the water, and formed terraces with soil dug from the dry bed. During the process of digging, it was found that lines of piles had been driven into the ground in some old time, and the stumps had been preserved in the peaty bottom. A schoolmaster of the district (who deserves something better than to remain anonymous) notified the

Antiquarian Society of Zurich of the discovery, whereupon Dr. Keller, president of that learned body, visited the spot and made proof of what is at least an interesting episode in early archæology, if it is no more. So many antiquarian wonders had disclosed themselves within a few years preceding, that his account of new developments excited search elsewhere, with the result that two or three hundred sites of aquatic dwellings have been found, not only in Zurich, but in the lakes of Neufchatel, Geneva, Brienne, Morat, Zug, and smaller pieces of water, as also in France, Germany, Austria, and Lombardy, and even, though less accurately recorded, in Eastern Europe, thus showing that the custom of dwelling on the water was at one time widely spread. Some of the sites, however, are small, consisting of room for but a few huts. The description of one settlement closely resembles all the others. In 1856, in draining Wretham Mere, in Norfolk, were found the remains of a lake-dwelling, the piles embedded in peat. Similar vestiges have been noticed in Scotland and North Wales. We may look for other instances being found.

Speculation becomes fanciful in attempting to account for the origin of the tribe or people who adopted the singular custom of building their houses over the water. Common sense does not permit us to regard them as beings spontaneously sprung from the soil of Switzerland. They must have been immigrants from somewhere. Advocates of the belief that creation was in the East, and that civilization flowed thence westward, see only settlements of a migrating contingent, perhaps from the

country of the biblical patriarchs, that had arrived at a patriarchal and pastoral stage. This supposition is beset with difficulties. Others with equal, if not more surface probability, would make the first arrivals one or more bands of gipsies from the mystic land of Egypt; but, if so, it is difficult to perceive the attraction that would lead them to settle among the Swiss mountains. Without committing one's self to an assertion, there is more likelihood that the first dwellers on the lakes were offshoots from the North, most likely from Denmark. Evidence (for instance, the great number of early kitchen middens) affords grounds for supposing that the shores of the Baltic, different as to topography then, had become over-populated. Swarms from the hive might fly south, as they did in the last days of the Roman Empire. This supposed origin would in part account for the immigrants representing a skill and intelligence gained among a more populous community superior to the average of isolated and sparsely scattered bodies. The fact, too, that they arrested their flight where there was water, tends to indicate that they were accustomed to draw a portion of their food-supply from that element, while from their taking up a permanent residence it is supposable that they had not been hitherto habitually nomad. Their choice of locality discloses a habitude with the shores of the sea, if indeed it do not show that they had aforetime been dwellers on islands. Moreover, did they at first really erect their dwellings over the water? We have no assurance that the mountain lakes, in which vestiges of continued residence have been found, have always

stood at their present level. In proof we have seen that in 1854 the waters of Lake Zurich greatly receded for a time and again returned to water-mark. There is nothing unsupportable, therefore, in the theory that the first settlers were *shore*-dwellers, not dwellers on the lake itself. The margin of the lake would be marshy, perhaps occasionally overflowed. The shore, too, would have a luxurious growth of herbage, that would attract the game on which these people, joint hunters and fishermen, fed, and where domestic animals would afterwards find abundant pasturage. Any person who has chanced to see a beach fishing-stage overtaken by a high tide, with its fish-drying sheds, men's sleeping and cooking quarters, and the like erected on piles driven in the sand, has seen what a Swiss lake-dwelling must have been like. Moreover, few except wharf-builders who have tried to sink one end of a log unweighted with iron through some feet of water and to drive it perpendicularly in the ground, can appreciate the difficulty these lake builders would have found had they really driven piles in the lake itself. If erected on the marshy shore, the work would have been easy in comparison. Such constructions raised on piles might have been at first merely above overflow of the miry shore, but have been afterwards flooded by the lake, when the people, finding their homes in the water answered every purpose, were content to use them, and the custom became adopted. A few feet of general rise in the lake would account for the morass-dwellings on the shore becoming surrounded by water, and a few more for their being submerged. A total absence of

human bones on the sites preclude the idea of the settlements having been brought to an end by massacre; and it is improbable that the whole population along an extended shore would all make up their minds to a simultaneous emigration, yet they appear at one definite time to have ceased. A slight change in the level of the lakes would afford an easy and reasonable explanation.

The terrace or floor of logs on which the dwellings were built was supported by rows of posts, of unbarked trees 16 to 20 feet in length and 6 or 8 inches in diameter, of oak, beech, birch, ash, and the resinous woods, which could have been felled by the aid of fire and pointed by the same means with the help of celts. The houses seem to have been constructed of boughs bent bee-hive shape (not angularly, as some have supposed), wattled with reeds and plastered within and without with clay—miniature caves—with a flat slab of stone serving for a hearth in each. These platforms were erected in shallow water not far from the shore, to which they were connected by a narrow causeway of piles. Overlying the decayed stumps of the posts on each site a bank of sand had collected, which being removed discovered another mound of *detritus*, chiefly consisting of decayed organic matter that had fallen from the habitations. It was in this "relic bed" or "archæological stratum," as it is called, that vestiges of the residence of man in his water-dwellings were found.

The "finds" were rich where villages had stood over the submerged relic mounds. They comprised all the

implements of stone described in previous chapters as having come down from the neolithic age. At the same time we may here say that, contrary to the opinion at first entertained, most, if not all, of the settlements are now assigned to the bronze era. It is true that in Meilan, for instance, no relics of metal-work have been found, but this might well be without relegating it to an earlier age.

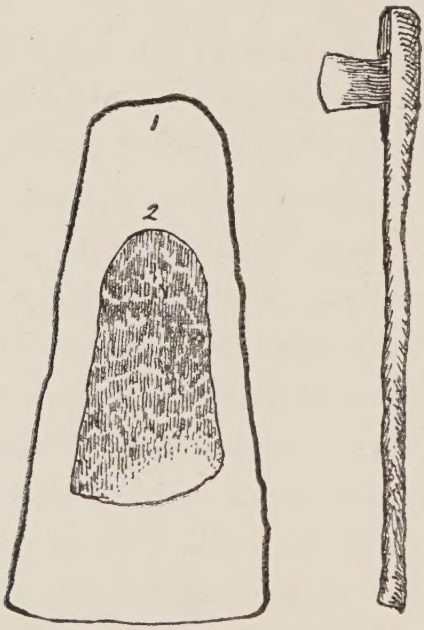


Fig. 80. Two celts, serpentine, full size. Pole-axe.

Celts were the implements most in use among the lake-dwellers. Few were of flint, that material not being found nearer than the Jura. The great majority were of serpentine, basalt, diorite, syenite, quartzite, and other stone, many polished and some few perforated for shafts. Generally (fig. 80) they were of small size. Pole-axes ranged from 4 to 8 inches in length, and at the cutting edge $1\frac{1}{2}$ to 2 inches. Arrows were also small, $1\frac{1}{4}$ to $1\frac{1}{2}$

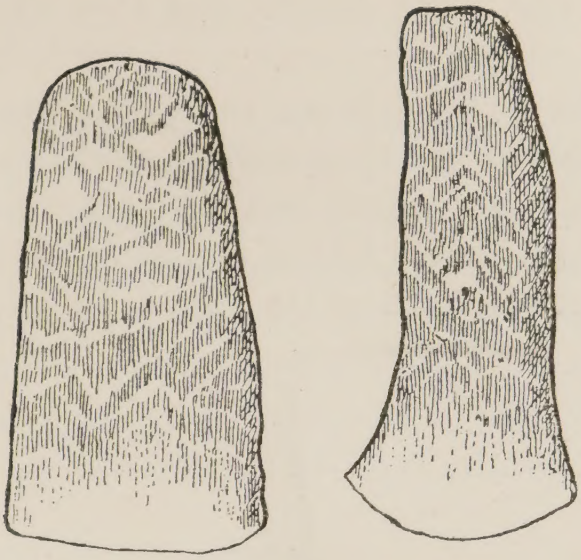


FIG. 81. Celts, serpentine, $\frac{1}{2}$-size.

FIG. 82. Arrow, stag-horn, full size.

inches, the material being generally flint, triangular, lozenge, barbed and stemmed, and notched. Fragments of wood, supposed to have been bows, are of yew. Spear-heads show no special feature (fig. 83). The implements named were fashioned on the spot, many in progress of

Fig. 83. Serpentine.

manufacture having been found, as well as flint saws, 2 to 3 inches in length, by which they were cut. All implements except celts were likewise made in staghorn and bone, as pegs, eyed needles, and barbed fish-spears. Notwithstanding the perishable nature of wood, some

articles of oak, yew, and maple have been preserved, in the shape of bowls hollowed by fire and smoothed with a gouge. Charred nuts and fruit were among the *débris.*

Although, in all, some thousands of articles of bronze have been collected, they are in general less valuable than might be expected, leaving room for the inference that the lake settlements had ceased to exist before the bronze age had reached its full development. The most

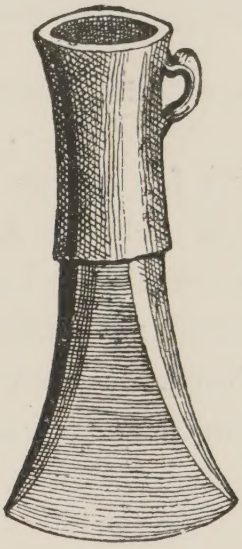


Fig. 84. Socketed axe, bronze.

important of these are axes, the greater number of which have the peculiarity that they are made to be fitted on the shaft in the manner of adzes, instead of transversely as stone celts were. In weight they range from 10 to 15 pounds, and in length 4 to 8 inches. Many are made with lappets to be bent and riveted over an angular shaft, the larger ones having a ring for a ligature. Others have sockets of various designs, including tubular,

as well as the ordinary cylindrical and square socket-holes. Well-finished chisels and a great many knives with good cutting edges, and intended to be fastened in handles, have been obtained. Some of the knives of curved shape are known as "sickles." Small sharp blades known as "razors," were evidently for shaving

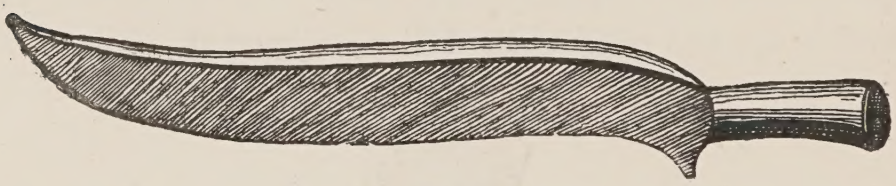


Fig. 85. Knife, bronze.

skins. Numerous pins for *coiffure* or for fastening apparel are among the relics. A number of bronze bracelets, generally of small size, and pendants for necklaces have been recovered, not differing from those worn by women of the bronze age on land. A very few bronze swords of an ordinary type are among the finds.

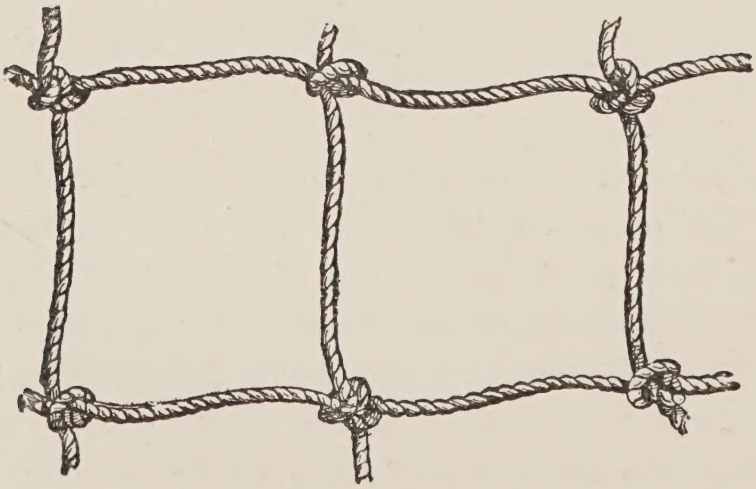


Fig. 86. 2-inch mesh, flax

The mode of life of the lake-dwellers can be guessed at with tolerable precision. No licence is given us to

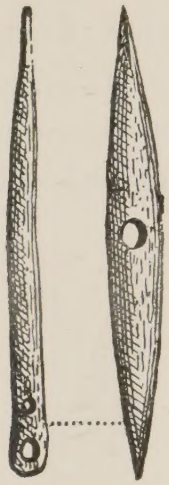


Fig. 87. Fish-hooks, bone.

imagine their indoor habits as in advance of the torpor that with uncultured man passes for content. Out of doors their main dependence and chief occupation was

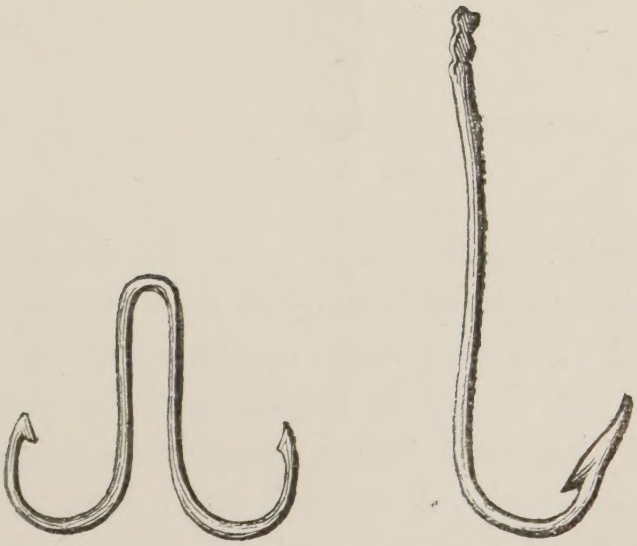


Fig 88. Fish-hooks, bronze.

fishing. Abundant supplies of fish could be drawn from the lakes. Remains of nets—preserved by having fallen into pitch—are extant, also bone fish-hooks in shape of needles, which, suspended from a line, caught in the gorge of the fish. At a later period they had barbed hooks of metal, of patterns in use by modern fishermen; and at all times had barbed fish-spears and harpoons,

Fig. 89. Gaff, stag-horn.

usually made roughly of deer-horn. The boats used were those hollowed from logs, more than one having been disinterred from peat bogs; one in a good state of preservation was 12 feet in length by $2\frac{1}{2}$ in width. This species of boat would bear a considerable weight, and if carefully ballasted and supplied with a keel, would carry a mast and sail, although probably not so used on the

lakes. From observation of the bones in the waste-heaps a fair idea of the fauna of the period can be arrived at. Bones of ox, sheep, and goat have been identified, showing that the dwellers possessed flocks on land; but the small proportion as compared with those of wild animals implies that the latter supplied the main portion of flesh food. The wild animals were the ordinary creatures of

Fig. 90. Harpoon, bone, full size.

the chase, urus, bison, stag, roe, boar, fox, as an article of food, and a variety of land and water birds. Domestication of animals must have been on a very limited and imperfect scale. Judging of the population by an estimate of the area of platform, one settlement in the lake of Constance would have numbered 1,200 souls, another 300, and others proportionately. One requires a lively fancy to realize the pastoral word-painting drawn by a

distinguished French writer, of the dwellers' herds being driven across the causeway into the town every evening and led forth to pasture every morning, guarded by faithful dogs. Flocks and herds must needs have been more numerous than their bones show them to have been, to have made cattle-raising the engrossing occupation of so many people. The domestic dog does certainly appear elsewhere in the bronze age, and may have been known to the lake-dwellers. The term "Agriculture," however, embracing as it does both grazing and the growing of crops, is too comprehensive an expression for any industry that these people could have been engaged in. At most their arable work could have been but petty kitchen-gardening of potherbs, grown in common on the mainland near the settlements. No areas that seem to have been cultivated as cornlands have been traced; and although stress is laid on barley having been recovered from the lake silt, it must not be overlooked that farms have margined those shores for hundreds of years, which may account for ears of wheat and barley found in the lake sand, and also that seed grain in the first instance would have been difficult for these isolated lakemen to obtain and convey. The horse does not seem to have been yet broken for use. Although the lake-dwellers could not be called an agricultural people, they may be regarded as having been semi-pastoral, inasmuch as, although depending on the water for the greater proportion of their food, they yet kept a few flocks on land.

A certain degree of incredulity is allowable that the

lake-dwellers practised cloth-weaving and dressed in cloth, and the disbelief is not removed by inspecting the carbonized scraps of linen fabric conjectured to have been woven on a loom. *A priori*, one would imagine it unlikely that a tribe of fishermen-hunters would clothe themselves in fabrics so laboriously produced, so easily damaged, and altogether so unsuitable for rude work, while they had material of dressed skins to convert into durable garments pleasant to wear. The theory of their practice of cloth-weaving seems to have arisen from a

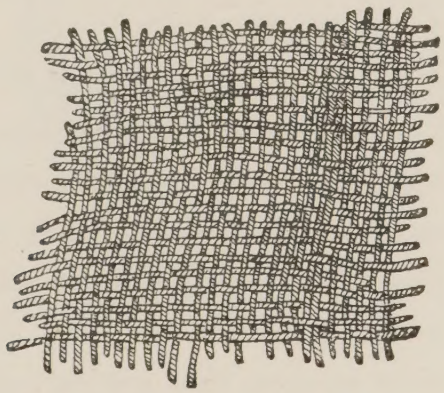


Fig. 91. Fabric of vegetable fibre.

misapprehension of the object of certain stone implements obscurely resembling gear for a loom, but which might have had other uses. It is not easy to see why these men, who spent their time alternately in rough work on the water and in the forests, should want to change their serviceable hereditary costume for one in every way less suitable. Certainly not for garments of linen. If dress of artificial material were sought when skins ran short, it could have been formed in felted wool, and would have been enduring. Moreover, if the relics

said to be weights, whorls, and other loom gear were really such, they are far too few to be the remains of an industry that provided clothing for a people. Appended, (fig. 91) is a fabric that has been found in the lakes. The uselessness of such material for general clothing is manifest. Other tissue of unbleached flax, of a similar fibre, more closely woven, yet still open, has been found, of coarser make; also other of closer work, both woven and plaited. Samples are engraved in Figuier's excellent work "*L'homme primitif*," and others in the *brochure* of Professor Rau, of Washington, U.S., "Early Man in Europe."

The mode of sepulture among the lake-dwellers is obscure. Earth burial being contemporaneous with the settlements, the deceased were no doubt committed to the earth on the land, and search may yet come on some burial-place. The dead would not be carried out and sunk in deep water, for, besides that the absence of human bones points against that custom, fishermen, even at the present day, have an insurmountable objection to casting their nets where corpses have been, as in the case of shipwreck with loss of life. Here again it is forced on our notice, as in the stone age, that the relics, so far as yet found, show nothing that would testify to the celebration of religious rites. One peculiar article, the use of which is unknown, has been supposed by imaginative persons to be a symbol of the worship of the moon. Specimens, all large, crescent-shaped, have been found, up to 16 inches between the horns. Other writers have shown the identity in shape with the sleeping

"head-rest" of the Egyptians; but such large and heavy articles in stone would be out of place in the lake huts. Besides, too few have been found for them to have been in general use; and why make them of stone when wood would have been so much easier to manufacture and so much more portable? The Egyptian head-rest is described as "a curved semi-elliptical piece of wood adapted to receive the back of the head which fitted into it." Possibly these stone crescents were no more than "pauls"

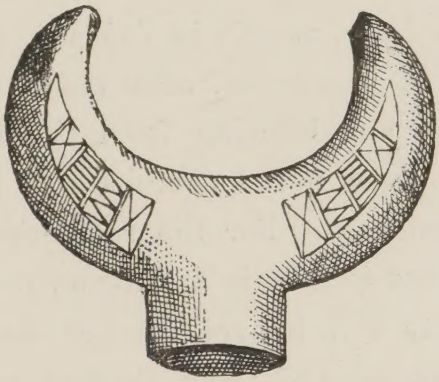


Fig. 92. Crescent-stone.

set on the wharves for hauling in ropes of boats and fishing-nets over the groove, as a substitute for a pulley.

All the lake-dwellings in Europe were not contemporaneous in their date of settlement, nor nearly so. At Voiron, in the department of Isere, in France, lake habitations investigated in 1865–6 disclosed wants unknown to the Swiss. The Voiron houses were of timbers mortised and fitted with doors and window frames. Numerous implements of iron, bronze, and horn, as well as of stone, were found. Among these articles were iron knife-blades, chisels, awls, cramps, and fish-hooks, and, it

is said, a piece of blue enamel; but this last might have been a spontaneous product of vitrification in smelting. Pottery of the Roman type was also found. From this it is safe to assign the Voiron settlement to a date later than Cæsar's invasion.

To conclude. Leaving it an open question whether the Swiss lake-dwellings were at first lacustrine or palustrine —erected on a lake or on its margin—brief notice may be taken of habitations built on piles in marshes identically with the lake villages. These have been specially investigated in Italy, mainly in Tuscany, and are known by the name of *terramare*, also *marniera*. Relics of bronze and stone not differing from those of the Swiss habitations have been found therein, also the remains of domesticated animals. For the rest—the lake-dwellers were a tribe—but seemingly a tribe only—interesting in many points that will be yet further elucidated, but at present our knowledge of them reaches no further than as a comparatively small body of colonists of the bronze age who adopted that mode of life for reasons that we do not now fully see. Their level of civilization was much on a par with that of the American mound-builders.

CHAPTER XV.

POTTERY.

Pottery the Earliest of all Manufactures.—The Work of Women.—Development of the Art.—Many Cave-dwellers unacquainted with it.—Others showed Skill.—Fragments in Caves and elsewhere.—In Kitchen Middens.—Whence Ornamentation arose.—Ornamental Markings in Stone Age.—Tempering of Clay.—Belgian, German, Danish.—Lacustrine.—American Mound-builders.—British Pottery never Excellent.—Imported Phœnician Earthenware.—Potter's Wheel.—Pottery of Bronze Age.—Ornamental Markings in that Age.—Age of Iron.—Table of the Art's Progress.—Vessels of Stone, Amber, and Gold.

Pottery of baked clay, although so fragile, is, as a memorial of the persons who fashioned it, only second in endurance to implements of stone. When hand-made it is the simplest of all manufactures, as it is the earliest. The articles made from it coming within the class of domestic utensils, the construction of them would devolve upon the women in uncivilized life. It is a manufacture in which is little choice of materials and involving little labour. Nevertheless, "crockery" is a possession that women take pride in; and accordingly, among specimens rescued from localities widely apart, we find early attempts to ornament it. In a Report on American Ethnology published by the U.S. Government is given an

Indian legend of the adventures of the Rabbit which says, "The next day he saw two men making arrow-heads of stones; . . . the following day he came upon two women fashioning jugs. . . . Looking around he said, 'Let me go into your clay,' and they allowed him to do so. Then he said, 'Now braid the neck.' This they did, making the neck small." Here we have the respective occupations of the sexes.

The first practical use of clay would be a hollow made in a shapeless lump to serve some temporary purpose of holding liquid. Next the walls of the lump would be raised to give greater capacity as a vessel. Not unlikely the first clay lump would be set near a fire to dry, and from this would be discovered the art of hardening by baking. The rude requirements of people who lived in the open air or in caves near a stream would not demand capacious water-vessels. Accordingly, almost all the fragments found belong to jugs of the capacity of from a pint to a quart. The art of moulding and firing seems to have been a talent in some families and not in others, for relics from adjacent places show no uniformity of skill. All specimens, however, are not fair criterions. A wide difference exists between pots hastily made for passing use and broken when done with, and those intended to be preserved. Nevertheless, a distinct progress can be traced in the illustrations to this chapter, not given in strict chronological sequence, but shown by arrangement of taste.

No fragments of pottery have been found in the river gravels, but it by no means follows that men were unac-

quainted with it, for it would have been ground past recognition in the flow of torrents. The knowledge of it among the cave-dwellers was very limited. Some of the cave-dwellings in the south of France appear to have had none, although they have produced attempts at carving on bone. The celebrated cave of Bruniquel, though rich in implements of flint and bone, has yielded none. The valley of the Vizère (Dordogne), none. On the other hand, in a cave near Nismes, not far distant, were found deep down with remains of the mastodon, and also in a surface deposit, fragments of plain but good make. On the plain of Souletré, potsherds have been found, but

Fig. 93. Early, unornamented.

none showed attempt at ornament. The singular tribe, or association of tribes, that periodically visited the sea-shores and left their traces in shell heaps wherever shell-fish abounded, seem to have had sufficiency of pottery, many fragments being found among the shells. All are of unpurified clay intermixed with coarsely pounded stone or shell and insufficiently baked. The form is intended for circular, evidently hand-made by unskilful fingers and without ornament. Without doubt a knowledge of earthenware in time became general. It was still devoid of ornamentation, and followed one or two rudimentary shapes as in fig. 93.

As time went on, greater skill was acquired and a glimmering of taste began to show in domestic ceramics. As we have said, there are plausible grounds for assuming that the making of clay ware was woman's work, and the inference is natural that she would try to make it as pretty as possible. Now the range of pretty things with which she was then acquainted was extremely limited

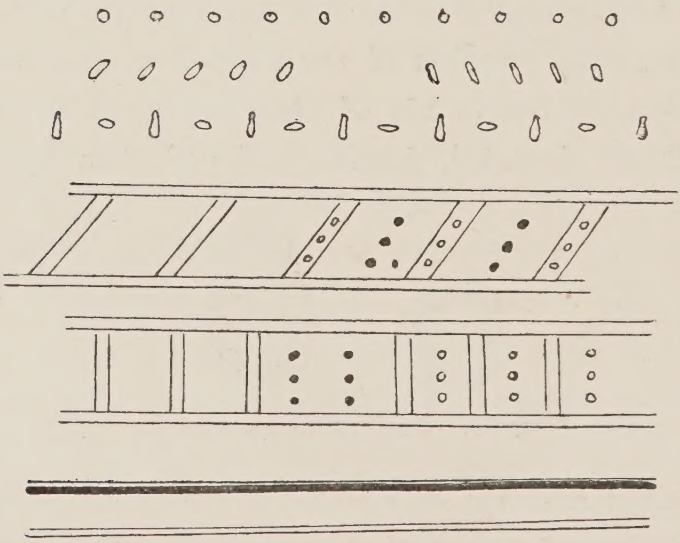


Fig. 94. Ornamentation of Stone Age.

and confined to her personal adornment, such as beads and pins. Accordingly, as these were the things she took most pleasure in, she seems to have tried to represent them on her pottery, if only in dots and scratches. True that such rude personal ornaments are common to both sexes of savages, but that fact does not destroy the argument. Those ornamental thumb-nail marks around primitive earthenware may at first have been the fancy

of an individual, but their identity is remarkable over places widely scattered. Fig. 94 shows that the ornamentation of earthenware during the later half of the Stone Age in Europe was a combination of dots and bars, beads and pins. Dishes believed to be of the very earliest date are without any of these marks.

Besides the adoption of surface lines for embellishment, a greater variety in shape began to appear. Belgium has

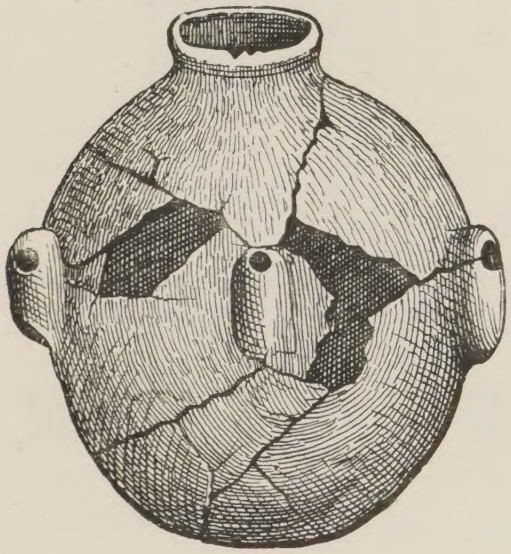


Fig. 95. Water-bottle.

supplied specimens in various designs. One, as shown in fig. 95, a gourd-shaped water-bottle, was found in a Belgian cave. Articles from the Swiss lacustrine dwellings show little general improvement, although those settlements ran into the iron age. Exceptional instances of better manufacture are, however, found. One is represented in fig. 96. It is noticeable that forms similar to the Swiss, as well as to British, vessels are found in an

early Egyptian painting of a potter at work (fig. 97.) British pottery was never of high excellence until very late times. Little improvement can be perceived during

Fig. 96. Lacustrine.

the bronze age or in that early period which this treatise covers. Native ware was all hand-made and of clumsy shape. Fig. 98 represents ordinary forms of drinking-

Fig. 97. Egyptian.

cups. All vessels were hand-made; and if fragments of superior make are discovered, the chances are they were

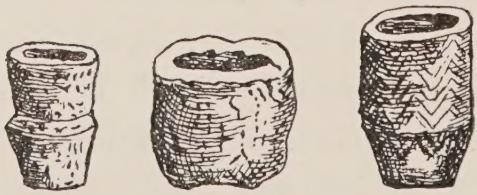


Fig. 98. British drinking-cups.

of Phœnician importation. The distinction between the two manufactures is very noticeable. Roman taste af-

fected pottery in Britain for the better, both in material and design, the ornamentation having developed into interlaced bands, linked rings, vandykes, and other effective forms, but not yet into representation of objects animate or inanimate. Specimens of marked artistic merit found in the Thames may have been of late date and imported. Denmark excelled not only in skilful chipping of flint and polishing of stone, but many of her ceramic manufactures were well made and of graceful design, but from the markings they must in reality be

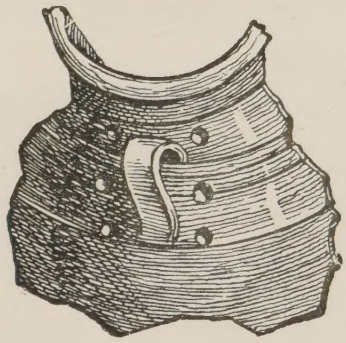


Fig. 99.

assigned to the bronze age. Spouts and handles to vessels did not come in until that era.

The people known as the American mound-builders excelled in ceramics all other transatlantic races, excepting later the Mexicans and Peruvians, and were greatly ahead of their supposed contemporaries in Europe in that respect. The material they used was a clay of greyish colour, which they mixed with river sand and pounded shells, or with crushed feldspar, particles of mica or small quantities of lime, and the finer kinds with gypsum. Their relics are not smoke-blackened, but have

come out clear and crisp, which leads to the supposition that either they had baking-kilns or were acquainted with the method still—or till recently—practised by the Indians of California, of baking in a covered pit heated by air from blazing chips of wood. No fragments show marks of having been turned on a lathe, although the circular shape is well preserved. Great difference exists between their pottery for every-day use and that for

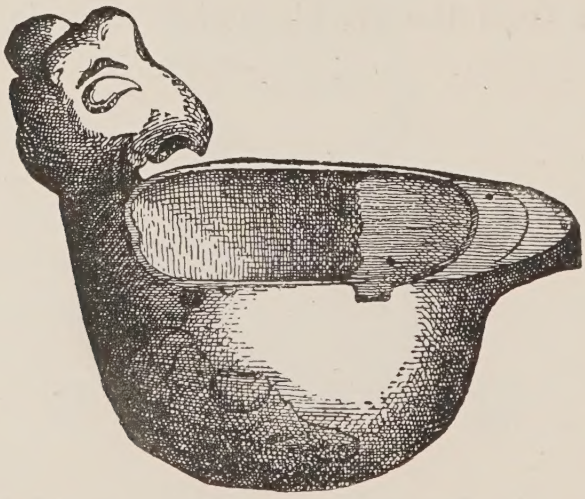


Fig. 100.

preservation, so that a range of articles from clumsy to artistic may be found in the same ruins. The grotesque seems to have been attractive to these potters. Fig. 100 betrays the hand of man, not woman, resembling in *motif* some of the tobacco pipes that men carved for themselves. An example of their finer work is shown in a funeral urn (fig. 101). A great diversity of tobacco pipes in clay and pipe-stone have been recovered from the mounds. Indians of the present day exhibit con-

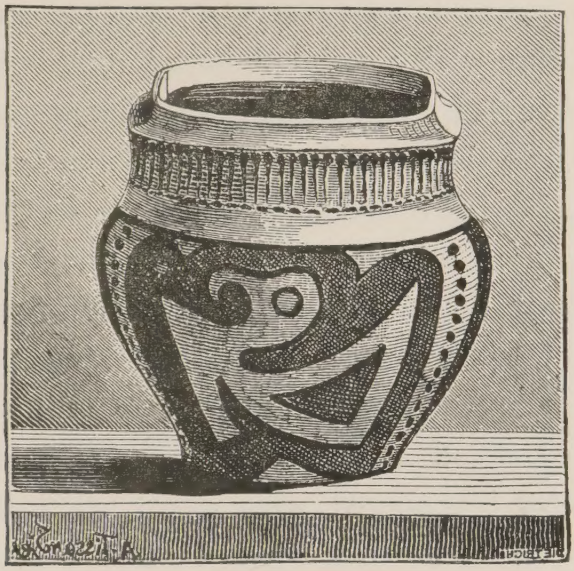


Fig. 101.

siderable freedom of fancy in fashioning pipes; and the mound-builders did the same. Figs. 102 and 103 exhibit

Fig. 102.

Fig. 103.

two specimens, the first of clay and the other of stone. Another pipe head represents the bust of a woman, the

pattern of her necklace preserved; and yet another is the head of a man with a pointed beard of Assyrian cut—an "oiled and curled Assyrian bull," as Tennyson hath it.

Pottery, we have said, continued generally as rude during the bronze epoch as it had been during the time of stone. Woman's work, it would be little cared for by men more worthily employed in metal-working or in the processes of husbandry. Around the furnaces in the age called of iron are found many shreds of clay vessels of the type classified as Celtic, poorly baked and of untempered clay intermixed with small nodules of quartz. The vessels were evidently made as required, and are not to be taken as a typical standard of the time, for numerous instances of good form and make have been found in various places. We now begin to notice figures of animals represented on urns, not accurately designed, yet showing a partial advance in ideas evoked in the transition from the bronze to the iron age. The ordinary ornamentation of the bronze age is given in fig. 104. The pottery of the lacustrine settlements of Switzerland is of the bronze age.

Even in the early period of the Iron Age ceramics remained without taking any great stride beyond the age of bronze. Generally vessels were badly baked and smoked, although some seem to have been turned on the potter's wheel. A few specimens of finer make are not thought to date earlier than the spread of Roman taste.

As an aid to memory, the progress of early pottery manufacture may be briefly summarized. 1. For temporary use mere lumps of untempered clay, sun-dried;

for longer use, baked in an open fire. 2. Tempered with sand, vessels made lighter, and shape more circular; baked. 3. Clay better tempered, circular shape more accurate; ornamented with dots and short incised lines. 4. With handles and spouts. 5. Ornamented with transverse incised lines, also circles made by pressure of a cord. 6. With circles and knobs in relief. 7. With figure handles. 8. Elaborate, with figures in relief. 9. Painted after baking. 10. Of stone.

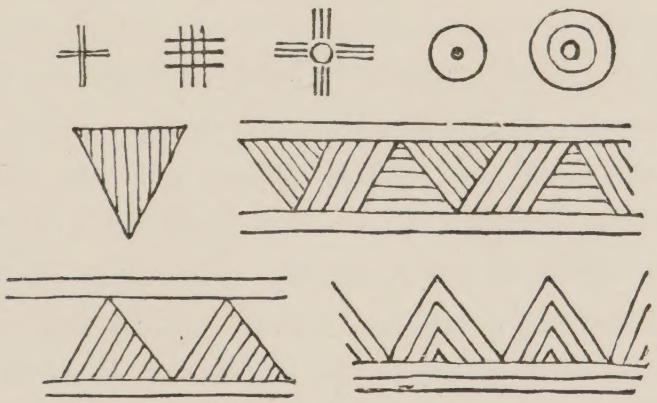


Fig. 104. Ornamentation of Bronze Age.

Funeral urns among all early tribes were made with the expenditure of but little labour, and were seldom thoroughly baked. Examples of form are given in the chapter on Sepulture.

Although not strictly pottery, drinking-cups and other vessels of stone have been found, not probably of remote antiquity, and in all likelihood hollowed with metal tools. Several of soft stone have come from Scotland and the Western Isles, from three to six inches in diameter, sometimes provided with unpierced handles, and ornamented

with rings in relief. Their date has been assigned to the Druidical era. Cinerary urns of similar stone up to twenty-two inches in diameter have been met with in the North. Two small cups wrought out of shale, that may have been drinking-cups, were found near Honiton, placed beside the dead. Evidently they had been turned, and are attributed to the later bronze age. A small cup of amber was found with bronze implements at Hove, near Brighton, and a small gold cup in a tumulus in Cornwall. These two last may have come from the Phœnicians or from Gaul.

Colouring does not seem to have been in use in European pottery. Fire glaze was unknown. When mineral fluxes are used for surface glaze, pottery passes into ceramic art. Britain could not have been a large importer of earthenware from the merchants of Tyre, for potteries were in existence in Staffordshire and elsewhere in England in the time of the Romans.

CHAPTER XVI.

THE IRON AGE.

The Term "Iron Age" indefinite.—Discovery of Iron-smelting.—A New Era began with Iron.—How Raw Material obtained and smelted.—Large Number of Furnaces sprang up.—Some Hundreds traced in Switzerland.—Description of.—Forging and Tempering of Iron.—Axes.—Swords.—Hilts and Sheaths.—Daggers.—Spears.—Javelins and Arrows.—Trumpets.—Horses and their Caparison.—Ship-building.—Architecture, Domestic and Defensive.—Implements.—Trinkets.—Establishment of Marts.—Intelligence of the Age centred in Northern Europe.—Invention of Runic Symbols.

THE "Iron Age" is a very indefinite term. Unlike bronze, the knowledge of which is assumed to have been communicated by Asiatics to Europeans, iron was most likely a happy local discovery, either made by chance or sought for. Nothing is more easy to imagine than that bronze running short in some locality, another ore was tried with a higher degree of heat, and the result was a new metal, found to possess all the qualities of bronze and at the same time harder and in much more abundant supply. Information would spread far more rapidly at the close of the bronze epoch than it could have done in the stone age; and a knowledge would speedily become general of the splendid triumph of metallurgy that

then began, and has expanded so grandly to our own day. It is permissible to say that, take away iron, and the human race would fall back into its primeval barbarism.

With the first bar of iron smelted, a new era began. When we remember that men of the time of polished stone, which immediately preceded the epoch of working in bronze, had no means of procuring woodwork for their habitations or other structures but by splitting logs with stone wedges, smoothing with a stone chisel, and combining by means of wooden pegs patiently scraped into shape by a sharp flint, we must be struck by the enormous development that abundant iron opened, especially in the branch of structure. The article of nails alone, though seemingly a trifling detail, enabled men to frame permanent habitations, to construct furnishings for them, and, in the larger shape of bolts, to build sea-going ships. The industry of the bronze age did little in providing small articles of domestic use. There were few hatchets or chisels, but many implements of war. The demand for these last, joined to the comparative scarcity of the raw material, precluded the industry from devoting itself to the supply of domestic needs. That became an especial field of iron-working.

The smelting of metal would be no new thing to the generality at the beginning of the iron age. Most persons had seen the process of converting metalliferous stone by means of trituration and heat into a malleable material superior to flint or any other substance they had hitherto used. For want of raw copper ore, few men

could have themselves engaged in the manufacture of the articles they needed, although they might have collected it for the forgers. Here then was a revelation,—a material so abundant that every man might manufacture it for himself. The means were of the simplest; namely, a hole in the ground, and a supply of ore and charcoal. The new industry was rushed into. In the canton of Berne in Switzerland alone, the remains of over two hundred small smelting-places have been traced among the hills.

During the time we treat, ore would be procured wholly by collecting from the surface. Copper ores are more discoverable to the eye; but the "leads" have soon to be followed deep. Ferruginous stone, on the contrary, was a main constituent of the hills themselves amid which the furnaces were placed, and suitable wood for charcoal would be plentiful in every valley. Small parties of men combining could carry on the work.

M. Figuier is of opinion that the reduction of iron ore to a state of fusion for running in moulds would at first be beyond reach of the appliances with which copper was melted at a heat of 1,990° Fahr., while iron requires not less than 2,786° Fahr. This objection would apply to the small forges. He suggests that iron may be obtained from the oxide, reduced to a spongy state without fusion by the application of charcoal-heat, until when hammered in a red-hot state it is converted into a bar, and he refers to this process as successfully made use of by the Tartars in preparing small quantities of three or four pounds at a time. Means so inadequate would do

little towards advancing the industry when the new metal was first discovered; but experience in bronze-working had spread considerable knowledge of metallurgy, and the hillsides where iron ore was found were ere long dotted with forges. M. Morlot, naturalist, and M. Quiquerez, mining engineer, — authorities quoted by M. Figuier,—give a description of an iron foundry of the better class, restored, which may not be far astray in the main. From examination of the remains of many furnaces in Switzerland, Germany, and Sweden, these gentlemen found the erections sufficiently simple, and rather kilns than furnaces. A hole of moderate size was scooped out on a slope facing the wind. Sometimes, though not always, the hole was lined with stone, forming a kind of large crucible, with or without a funnel of clay. A layer of wood was placed at the bottom, then a layer of ore, then again other layers of wood and ore alternately, and the heap was lighted from the base when a strong breeze was blowing. Bellows for artificially raising wind do not seem to have been known. The fire, kept from blazing by the layers of ore, smouldered in charcoal; and iron in small quantities was found at the bottom of the kiln. Later, however, kilns of ten or fifteen feet in depth, coated inside with clay, were in use. M. Quiquerez's careful research in the Bernese Jura has distinguished two grades of furnaces, the first, and rudest, going back to the beginning of iron-casting, and the other of later but still remote date. The first kind were mere cup-shaped holes of no great depth, hollowed in the hill-side, and lined with clay, in which the ore was fed

with charcoal. The later, by far the most numerous, were on a much larger scale, being conical holes likewise dug in the hill-side seven or eight feet deep, and clayed within, but having no contraction towards the top. As these smelting-pits were not large enough to hold green wood, mounds of charcoal carbonized in the stack have been found near some of these early foundries. In historic times smelting establishments came to be largely improved in construction and equipment, turning out a much larger proportion of metal from the ore. Masses of iron ready for market, in shape of two connected pyramids, and weighing twelve to sixteen pounds, have been found. Silicious fluxes and artificial means for increasing draught do not seem to have been known until historic times.

The facility of obtaining material for manufacture soon produced mechanical skill, although inventive ingenuity was not marked. The production of weapons and other lethal implements still claimed a large share of the industry in tempered iron. Axes continued to be cast and hammered in iron, as formerly in bronze. Iron heads, however, were made larger and heavier, with a wider cutting edge. Lappets to be welded over the end of the handle fell out of use, and a square socket-hole was substituted, into which a wooden handle made with an elbow was driven, thus making the axe more serviceable in carpentering and wood-cutting. A modification took place in axes intended as weapons of war, the blade being made broader and heavier, with the edge crescent-shaped, from which it may be gathered that the shields they

were used against were strengthened with metal bosses, if not made wholly of one metallic disc, requiring effective weapons to cut them down. Hefts of war-axes were further given strength by being plated with iron.

Respecting the favourite article of manufacture, the sword,—the museum of Copenhagen possesses more than six hundred bronze swords, which weapons some have set down as being the product of the age before steel was

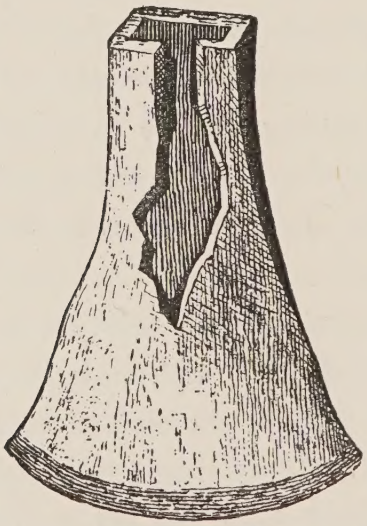


Fig. 105. Iron axe, square socket.

known. We think this conclusion is hasty, and are inclined to believe that no arm in the form of a sword was invented until the iron age. The value of this king of weapons would at once strike every one familiar with the use of arms, and warriors would be avid to possess one, but it does not follow that they wished it made of iron. The virtues of bronze were well known, its integrity, polish, and strength ; but the new metal was untried, and might prove inferior in action, for it is not pro-

bable that excellence in tempering was a discovery simultaneous with that of casting. The bearers of arms wanted their weapons of the best. If we read Homer aright, notable heroes at the siege of Troy had swords of bronze, while the common soldiers wore iron. For a long time many steel swords of the most approved quality continued to be hilted with bronze, showing that artificers worked

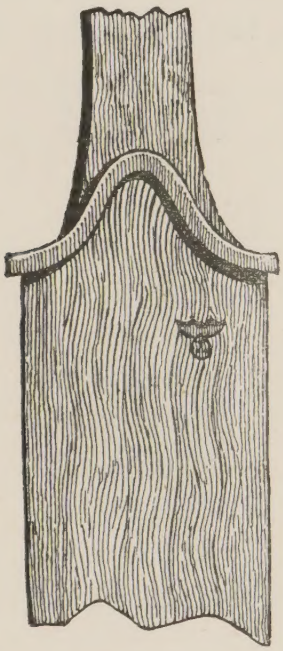


Fig. 106. Damascened sword-blade.

equally in either metal. If the supposition that swords were not invented till the iron age be correct, it would make the tombs in which bronze blades are found less ancient, it being at all times hazardous to assign dates from articles that might have been heirlooms. A general description of the sword-blades of the period is, that they were in general of one of two lengths—one short, about

16 inches, the other long, from $2\frac{1}{2}$ to 3 feet, adapted respectively for close combat, as with the Roman falchion, or for horseback, so that the cut might sweep clear of the horse. Almost all are thin, the *forte* and *feeble* well defined, and in fact very serviceable weapons. Experts in metallurgy have noticed that some of these sword-blades are of two qualities of metal, a centre plate consolidated to the utmost hardness, with a malleable strip along either side, so that the edge when blunted could

Fig. 107. Sword-hilt, iron.

be re-set by hammering. Damascening was not unknown, some fine blades having been welded of bars of different tints, so as to produce the waving lines so much admired. The possession of a sword of superior excellence was no less valued on the first invention of these arms than it was in later days, when heroes named their weapons "excaliber," "durindale," and "tisona," and it was the ambition of every warrior to be able to say with Othello of his sword, steel or bronze,—

"A better never did itself sustain
Upon a soldier's thigh."

A paucity of invention is noticeable in hilts. Common blades have the butt prolonged to a spike, around which a band of hide was wound and secured to fit the hand. In hilts of more pretentious blades, hide or bone or other perishable material would likewise serve. A common form both in sword and dagger hilts (fig. 107), though somewhat

Fig. 108. Sword-hilt, bronze.

awkward, may have served as a partial protection to the wrist. Scroll work in hammered bronze was dedicated to the hilts of the most highly finished swords. Sheaths offer some features of interest. Several weapons have been found still with remains of wooden sheaths that have been covered with leather, more or less traceable. Others were of thin plate iron wrought with the hammer, and with rings for attachment to the sword belt. Some of these metallic sheaths show designs either incised, or in

a kind of repoussé work, in which the horned horse, or armorial symbol of Gaul, more than once appears. Sword-belts were frequently of connected discs of bronze or iron, ornamented.

Daggers or poniards were a usual article of personal equipment. Generally they were in one piece, with the steel blade tempered; but sometimes were hilted with

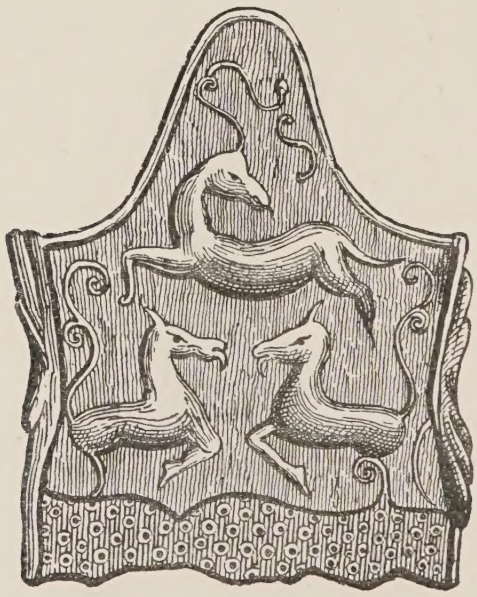


Fig. 109. Sword-sheath, iron.

bronze secured by rivets, in the pattern of swords in miniature, and worn in the belt as daggers of flint had been. A few have been found showing considerable fineness of workmanship and ornamentation. They were worn without sheaths; or at least, no evidence declares otherwise.

Spears of the period were of sufficiently formidable dimensions, some of them 16 inches in the blade, equally

suitable for war or of spearing the boar, which then ranged the forests. Commonly they were lanceolate in shape, double-edged, and occasionally serrated or wrought in fanciful shapes, as in fig. 110, representing one with scalloped edge. Much care was evidently bestowed on their manufacture. From the small size of

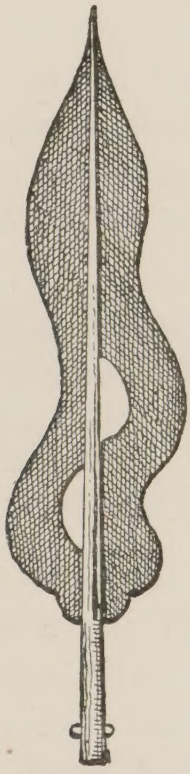


Fig. 110. Fancy spear, steel.

the sockets, the shafts seem to have been slender; and some fragments of staves, supposed to have been spear-hafts, were shod with iron ferrules. Javelins, on the contrary, were carelessly made. Most of them show a peculiarity in make, being short in the shoulder, mostly without barb, socketed for a heavy shaft, leaf-shaped,

and of rude finish, 5 to 6 inches in length. It may be remembered that in Roman times each legionary in the front line of attack was armed with two javelins, one to hurl on the advancing foe, the other as a defence against cavalry, and that the practice was imitated by the Goths. Weapons for such use did not require careful finish. Experiments made in France by direction of the late emperor, with prehistoric iron javelins, showed that they could not be thrown far with precision by mere strength of arm, and therefore must have been discharged by some mechanical power, probably not by balista, but by a thong attached (*amentum*),

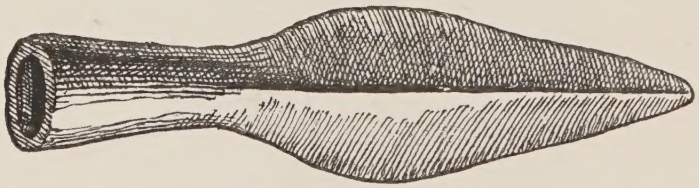


Fig. 111. Iron javelin, 5 inches.

on the principle of a sling, the weapon being whirled until it acquired a high degree of rotatory motion, and then suddenly loosed. These experiments demonstrated that a javelin such as described could be thrown by average strength of hand about 22 yards, but by a thong would fly a distance of from 80 to 90 yards, thus becoming a formidable missile when encountering an obstacle in its course. To the use of such projectiles may be attributed more than to sword, or even spear, the use of breast-plates and other defensive body-armour, a few pieces of which have been found. To the sword, however, we must credit the adoption of

helmets, which became general as steel manufacture advanced. Iron arrow-heads, on which not much expenditure of labour has been wasted, have been found in considerable quantity.

With the increase of warlike pomp, the horse of the warrior was decorated with metal trappings, and was shod with iron shoes not much differing from those customary now. Up to the date our treatise covers, horses do not seem to have been employed as animals of draught, a circumstance sufficiently accounted for by the absence of roads suitable for wheeled vehicles, notwithstanding that this has been somewhat gainsaid by an iron tire of a wheel having been found near Berne. Judging from buckles and other small metallic articles, ordinary caparison was not much different from now. A bit (fig. 112) is of a pattern still common in the rural districts. Saddles have not left any recognisable remains; but possibly mounted men were contented with rugs of skins for shabracks.

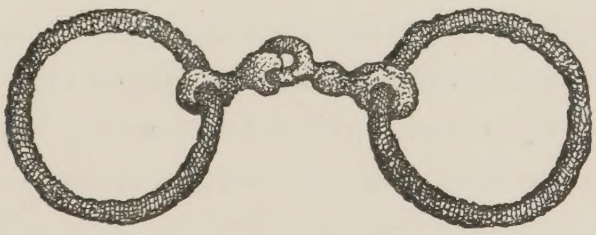


Fig. 112. Steel bit.

With cavalry mailed and helmeted, and armed with swords, came the pomp and panoply of war. We must go to the eddas for the information that troops of warriors had in their train clanging instruments of martial noise,

besides the beating of weapons on shields at the moment of attack. Trumpets and cymbals, the earliest instruments of sound of regular war, are supposed to have come into existence in the later part of the bronze age. In the stone age, horns of the urus would answer every purpose of a trumpet-call. The metal ages improved on the bison-horn, and produced war-trumpets of formidable volume.

How early the prehistoric men of the North began to build sea-going ships is matter of dispute. Doubtless long before the fleet of the twenty-sixth Egyptian dynasty circumnavigated Africa, about B.C. 600. At all events early in the iron epoch northern Europeans claimed to be kings of the seas; and on a knife-blade of the bronze age we already find a rude arabesque of a ship headed like a swan. Earlier than the northerners, in fact in the stone age, the sailors of Tyre were familiar with the Mediterranean, and may have turned their prows northward after passing the narrow strait afterwards called of Hercules, and thus have taught the mysteries of sea-going. Be the actual date left open for amendment, but the general standard of intelligence must have been enormously raised when men had the skill in shipbuilding and the daring in adventure that extended their enterprise from the land to the sea. From the changed condition of the people on land, the art of building with stone arose, by fitting together blocks of uncemented masonry. Architecture divided itself into domestic and defensive. The latter produced those singular structures, fortified watch-towers, also missile-proof underground vaults, with

others vaguely grouped as "antiquities of the northmen," a wide term that conveys nothing as to date, but which falls under the study of "Architecture." Domestic residences had become much improved in the early time of iron, stone and timber being alike used in the construction of dwellings.

Domestic implements, of which metal formed a chief material, likewise show that a vast advance had been made in manners, and in an increase of wants. The industry of the bronze age was much occupied in manufacturing weapons, or implements that might be used as such. The age that had now come added the handiwork of the artisan to that of the armourer. It is needless to catalogue articles of iron that would speedily come into common use. Carpenters' cutting and boring tools are frequently met with. Sickles of 6 to 8 inches in the blade, for the cutting of grain and grasses, are curious as indicating that agriculture had already developed into a system, but had not yet labour-saving appliances. Among the finds are many requisites for women's use, as scissors, tweezers, and the like, as also thin cutting blades (useful for many purposes), called "razors," showing at once that artificers had become skilful in the manufacture of small wares, and that considerable attention was paid to the toilet. Necklaces and brooches (*fibulæ*) were the chief articles of female ostentation. Bracelets, bangles, and ear-rings were worn. Some few were of gold, others of bronze, with some delicately wrought specimens in iron. These were produced by the hammer and graver, rarely by casting. It is believed the

blowpipe was not unknown. A considerable trade was carried on in amber. "Torques," or collars of dignity, often of gold, worn by chieftains at the time of the Roman conquest, are not within the period our remarks cover. Most articles of cutlery were now made of iron; but

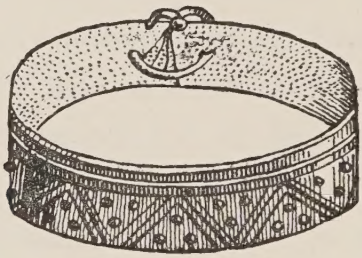


Fig. 113. Bracelet, iron.

from their tendency to oxidize, not many are recovered in good condition. A table-knife (fig. 114) dug up in Norfolk, will illustrate this.

When iron manufacture spread so rapidly, the supply must soon have exceeded any demand likely to be made

Fig. 114. Steel knife, oxidized.

by persons calling personally at the workshops. The two hundred iron-factories up among the hills of Berne, for instance, must have produced many times more than enough to provide all the near inhabitants with all the ironwork they could pay for. Industry does not continue to produce an unprofitable surplus. A market

beyond had therefore to be sought for. This would impose the establishment of a fair, either periodical or permanent, at some point accessible to customers, although it is difficult to see what portable articles they could have had to barter for metallic ware, or how such were disposed of when obtained in exchange. On this point we do not hazard an opinion. Considerable mystification has arisen from some authors assigning too early a date to the use of coined money, leading to the inference that coin was the customary medium of commerce from the time of the bronze age downwards. It is true that money was struck at an early date in Gaul, bearing the impress of that nation's arms, and that a coin of such stamp was found in a Swiss lake, in which were villages of the bronze era; but the evidence that in that age such tokens were the ordinary counters of commerce is defective. Ordinary calculation, however, makes it clear that so many furnaces alit would soon fill the immediate local demand, and the surplus produced would have to be disposed of farther afield. This would set in motion all the wheels of sub-division of trade—the producer, the wholesale and retail customer, and the middleman, besides the agriculturist to grow food for the large number of persons withdrawn from work in the fields.

Our theme is confined to the industrial progression of prehistoric man, otherwise it would be interesting to endeavour to trace the effect that a growing mythology had on mechanical art. If there are gleams of Orientalism later in the Sagas, any inspiration that may have come from the East, if assimilated, was roughened by the more

forcible character of the northerners. It is not to be overlooked that, in the early part of the iron age, it is the tribes of northern Europe that entirely fill the eye. Their intelligence had developed to a stage that grasped some of the abstract principles of society, and would further expand by mere progression of time into full civilization. Among them was approaching the Discovery of Typical Symbols, that is to say, of written letters. Although imaginative fancy is an unsafe guide, it is not difficult to see how a hieroglyphic to convey information, not only *could*, but almost necessarily would arise from the extended conditions of industry and its consequent trade :—

a. The least advanced savages, if gregarious, have pantomime; and the less expressive their language the more comprehensive their slight but significant gesture. A slightest motion of the forefinger in a more or less perpendicular or lateral direction expresses much.

b. This pantomimic meaning *can be rendered visibly to persons absent.* The position a twig or two is left in on a route conveys comprehensive information to parties following as to the direction the guides have taken or will take, also incidents of the journey or of contingencies to be expected. More durable symbols of the same kind would serve to commemorate events. Hence Runic inscriptions and painted rocks.

c. As to its domestic use :—suppose a forger of arms in the earliest time of iron, wishing to send word through many hands to a customer that an axe or spear-head he had ordered was ready and awaited him, what more

natural than to scratch on a waste scrap an outline of the article and send it as a notification thus: "one axe, two axes, and a spear"—ᚢ ᚢ ᚢ ᛏ (which symbols are in reality the letters *ur* and *tyr* of the Runic alphabet). The symbol would be intelligible. The priesthood would appreciate the possibilities of this means of communication, and hence, in time, a phonetic alphabet.

d. Hieroglyphic that could be passed from one person to another as representing value appeared in due time in the shape of coinage.

It may be said that the Iron Age belonged mainly to Europe. By the time its traditions began to report connectedly events of the immediate past, man's capacity was vigorous. His industrial efforts, that were to usher in a splendid civilization, were no doubt still crude, and in the beginning had expanded but slowly; but intelligence once awakened was continually progressive. When Runic inscriptions were cut with tempered metal tools, iron was in use in all the purposes of life. In face of these pictured or written columns,—even if yet untranslated,—the need for hypothesis ceases, for history has begun. And here is the suitable point at which to close our sketch of the industries of prehistoric man.

CHAPTER XVII.

SEPULTURE.

Respect to the Dead varies.—But their Memory generally preserved.—In the Stone Age by Cairns.—Cromlechs or Dolmens.—Earth-mounds or Barrows.—Passage-graves.—Advice to Explorers of Barrows.—Cremation and Cinerary Urns.—Votive Offerings with the Dead.—Standing Stones or Menhirs.—Druidical Circles.—Funeral Feasts.—Burial Caves.—Burial Customs of the Bronze Age.—Of the early Iron Age.—Costume of the Period.—Religion of the People.

The degree of respect paid to the dead is not in itself a criterion of the height that civilization has attained. It would be easy to cite examples to the contrary. Such respect arises from a more or less defined supposition that the animating principle of the individual continues to exist in some other place invisibly to the eye of the survivors—in a word, a belief in the immortality of the soul. The generality of this impression has led theologians to rest on it as a dogma, and to maintain that a conviction of its truth is inherent in man.

Although the earliest epic poetry—and epic is the earliest of all compositions—abounds with the plaints of "unburied ghosts" seeking sepulture, the custom among very earliest men would be to leave the dead where they fell, or, at most, to cast them out from the

presence of the living. The progressive steps appear to have been—(1) To cover the corpses with earth and to heap stones over the spot to prevent them being dug up by wild beasts. (2) As a further protection, to enclose the body within slabs of stone, and, in rocky countries, to heap a pile of stone over it. (3) When stones were scarce, to cast up a mound of earth over the spot where the dead lay in a coffin of stone slabs, sometimes placed in a rude chamber of the nature of an artificial cave. (4) To set up over the dead a pillar of unhewn stone, or a table of rock on two or more uprights instead of a mound of stone or earth. And (5) in time bodies were burned and the ashes preserved in urns of pottery placed in mounds in little chambers. All these burial systems belong to the neolithic or stone age, and were continued with slight variations in detail into the era of metals.

It is only from monuments that any information can be extracted as to the rites of sepulture among primeval races. The monuments embrace Cairns or stone heaps, Cromlechs, or as now more commonly called Dolmens, erect or standing stones, and Barrows or earth-mounds, together with stone structures of designs that involve questions touching on the religious belief and political administration of long ago, and known as Druidical remains.

The earliest and simplest of monuments is the Cairn, or formless heap of stone cast on the spot where the dead were either laid on the surface or covered with earth. Ordinarily the stone-heaps would not be larger than would answer the purpose of protecting the body beneath.

These small heaps would be easily dispersed or grown over and become unrecognisable. In the case of persons of eminence the heaps were of large size, the importance of the cairn indicating the fame of the occupant, every passer-by adding to it by casting a stone on the pile. Hence the Gaelic compliment, "curri mi cloch er do charne"—I will add a stone to your cairn. Three noted cairns near Fraserburgh, Aberdeenshire, each occupy a base of nearly 1000 feet by 40 feet in height. One in the parish of Minnigaff, in Galloway, Scotland, is nearly 300 feet in diameter of base; and another, very celebrated for its interior gallery and chamber, but believed not to be older than the Christian era, is on the bank of the Boyne, near Drogheda, Ireland, and measures 400 paces in circumference by about 80 feet in height. Some noted cairns have their base outlined by a circle of large stones, or even a double circle with traces of a ditch and wall. Some cover a burial chamber with the body packed in a rude coffin of slabs of unhewn stone, called a "cist," which coffin rarely reaches four feet in length, and still more rarely is the length of a man. Cairns are found in many rocky countries, as Scotland, Wales, Cornwall, and Brittany, also in Norway and Sweden; but few in Denmark. Most of them have some legendary name associated with them; but such popular nomenclature is an unsafe guide as to date, or even as to personality. Many cairns of remote age must have become covered with turf or wood, and have still escaped discovery. In more recent times cairns have been erected as landmarks and to commemorate local events.

In fig. 115 is represented a cromlech, or, as it is now generally called, a dolmen, from the Celtic words *daul*, a table, and *maen*, a stone. The word "dolmen" exactly describes a cromlech; namely, two or more unhewn stones erect on the ground and supporting one or more horizontal tabular slabs, with a paved, or unpaved, open space beneath. This is the simplest form; others more elaborate, such as Kit's Coty House in Kent, Wayland Smith's in Berkshire (alluded to in Sir Walter Scott's novel of "Kenilworth"), and Chun Quoit in Cornwall,

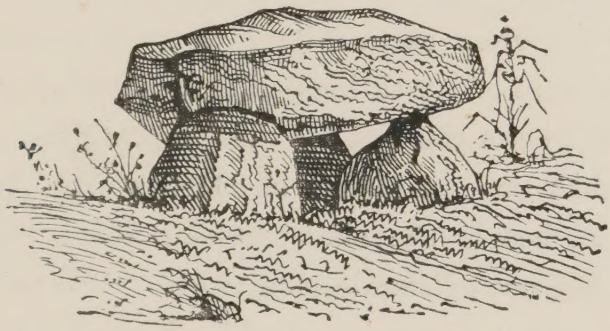


FIG. 115. A cromlech, or dolmen.

resemble artificial caves. The table-stone is often of surprising weight to have been raised to an elevation of several feet without a knowledge of the mechanical powers. An elevated slab 12 feet in length by 10 in width, is in place at Plas Newydd in Wales; one of basalt, 18 feet by 11 in Stirlingshire, Scotland; and another of sandstone, 23 feet by 17, on six supports, at Kilternan, Dublin, each weigh up to twenty tons. A remarkable one at Saumur, in France, is 64 feet long by 15 wide, unpaved, with four supports of six feet in height on each side, and one at either end, the four stones laid across the

top being of great size, one of them 24 feet in length by two in thickness. Dolmens are found in England, Wales, Denmark, Germany, Jersey, and Spain, but less commonly in Scotland, where the cairn is more prevalent. Cists with flint and bone relics in them are frequently found interred under the canopy in dolmens. A supposition has been offered, not without plausibility, that dolmens were not erected as we see them, but were the chambers of earth tumuli now washed away by rains, leaving the stony structure revealed. Although there are objections to this theory, it may have been true in some instances; for when certain barrows were opened, it was found they were of earth heaped over a cromlech. High antiquity has been claimed for these monuments, notwithstanding that one examined in Derbyshire had Roman coins placed beside the skeleton—an index to the date of burial, but not of the dolmen itself. The former idea, that these structures were Druidical altars, is now exploded. A frequent declination of the tables from the level originated the impression that they were sacrificial, but the divergence from horizontal is explained by the unequal settling of the ground. Brittany, part of the ancient Armorica, affords a rich field for the study of these and kindred monuments.

The class of monuments most frequently met with and the most readily come at for purposes of investigation is the Barrow, or Tumulus ("little hill"), which is merely a mound of earth heaped above a place of sepulture. Most of these are artificial works, although, in instances, interments have been made in natural mounds. They are

numerous throughout Britain. All have the same general characteristics—a grave, usually with cists, heaped over with a mound of superincumbent soil. Barrows examined in Germany have been classified into—(1) Tumuli without discoverable remains. (2) With bodies and flint relics, but no urns. (3) Without bodies, but with baked clay urns. (4) With bodies and urns, and in some cases, besides flint, articles of bronze and iron, showing these to be of a later date.

The late Sir Richard Colt Hoare, as long ago as seventy years or more, examined many barrows exhaustively in

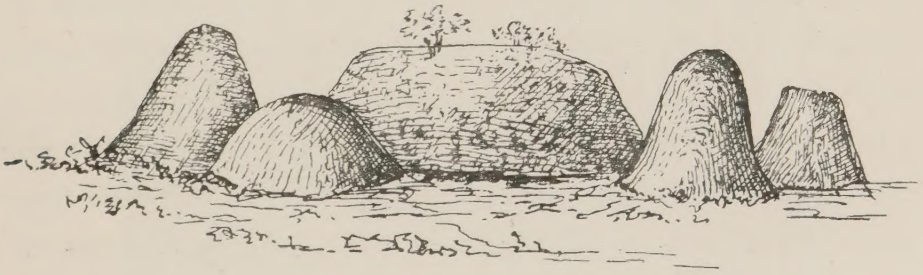


Fig. 116. Forms of barrows.

Wiltshire, Dorset, and parts of Hampshire, where there are many, and has arranged tumuli by shape in a classification which, slightly modified, still holds good, and is thus amended:—(1) The long barrow or tumulus. Probably the earliest, no relics of bronze or iron or articles of ornament being found therein. These vary in outline either from design or action of time, it being noticeable that many are wider at the end facing the east, at which end the bodies are placed on the floor, protected by a covering of loose stones. (2) Tumuli slightly elevated.

These may have been of greater height, but worn away by denudation. Of a date equally early with No. 1, or earlier. (3) The Bowl barrow, or most common shape, in form of an inverted bowl. Early. Sometimes having traces of a surrounding ditch. Examples in Dorset and on the Mendip hills in Somersetshire. (4) The Broad barrow, resembling the bowl, but wider and flatter at top. No evidence on which to assign a different date. (5) The Bell barrow. An improvement in symmetry on the bowl. Sometimes surrounded by a ground ring of stones. Examples near Stonehenge. Three, if not more, variations in proportion have been casually observed, and it has been surmised that these are the burial-places of women, the rather as there have been found small articles, as cups, beads, jet, and amber. They are assigned to a late date, contemporary with the Druids. (6) Yet more recent tumuli, belonging to the period of emergence from darkest barbarism. Frequently with gallery and central chamber. Among the most remarkable are the Bartlow hills, four truncated cones placed in line, in the county of Essex. In the largest, 142 feet in diameter by 44 feet in height, were found articles of bronze, glass, and enamel. Silbury hill, the largest barrow in Europe, covers an area of five acres, with a height of 140 feet. Its date, and even the object of its erection, is obscure. Burial barrows with a covered passage are called by northern archæologists *gangyraben*, which Sir John Lubbock translates "passage-grave."

Leaving out of account that burials might have been made within the precincts of cromlechs or other erections

long previously standing, the mode of sepulture coincided with the dates of the respective monuments in which remains have been found. Simple committal to the earth was the earliest. Next the body laid on a stone floor in no particular posture, or placed in a cist. Afterwards the body, if not in a cist, was placed in a sitting posture in a little chamber, the legs drawn up, and generally the head turned to the north. It has still to be investigated whether the relative position of the head looking to the

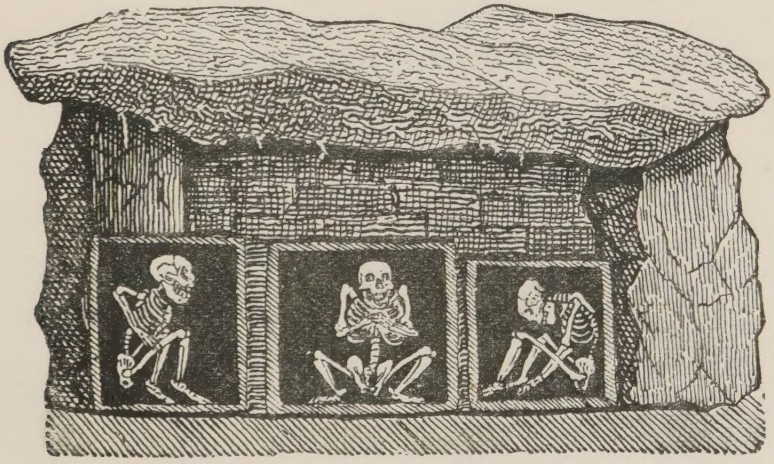


Fig. 117. Section of chambered barrow.

north, and in the long barrows the body being placed in the end facing the east, have any significance with these points of the compass. Later, when the body was calcined, the charred bones were collected in a heap on the stone floor of the barrow, or in a cist at ground level. Still later, ashes and bone fragments were put in an urn of baked clay, which was usually deposited mouth downwards. Urns of this description are common in museums. Danish antiquarians curtly sum up by saying with refer-

ence to their own country, "In the stone age the dead were buried in stone coffins, and in the bronze age were

Fig. 118. British funeral urns.

cremated and put in urns;" but many barrows in Denmark as well as Britain had funeral chambers.

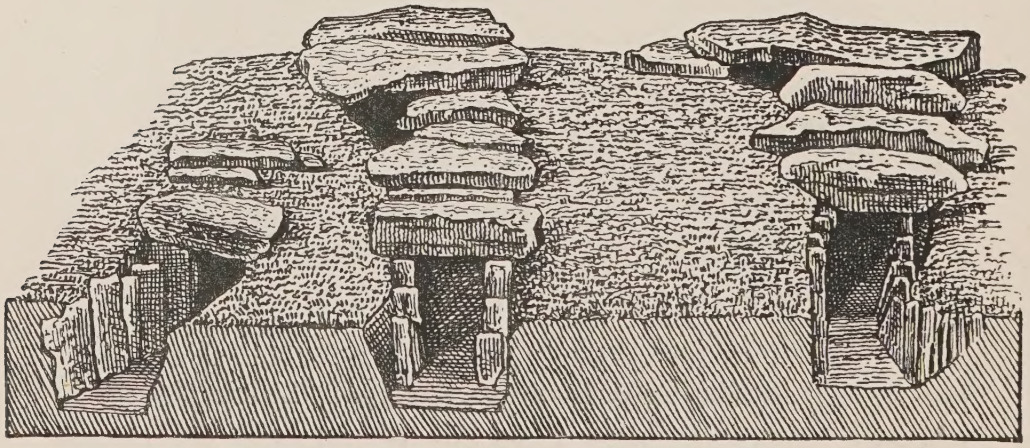


Fig. 119. Entrance to passage-grave.

Sir Richard Colt Hoare, in his examination of the Wiltshire tumuli, was the first to offer the opinion that burial and the reduction of the body to ashes were contemporaneous. Other antiquarians have followed his views. He no doubt adopted the opinion from having

met with skeletons and cinerary urns in the same barrow. It is nowhere evidenced that the difference in mode of sepulture arose from a complete change—that burial ceased and cremation began. A ukase of a czar might suddenly substitute one custom for another over the extent of Russia; but among primitive races spontaneous change is slow. Doubtless the one custom ran into the other, or ran along with it. Says a pleasant antiquarian

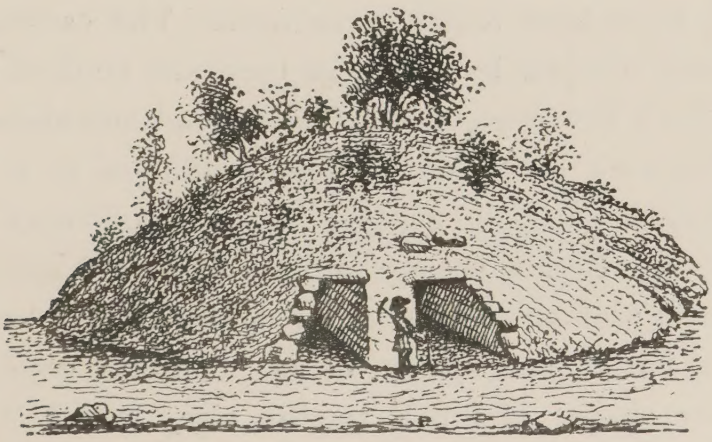


Fig. 120. Entrance to Danish passage-grave.

gossip in a magazine: "To those of my readers who may have any such ancient tombs on their estates, whether they be little hillocks or mounds, I will take the liberty of suggesting that great caution ought to be used in opening such tumuli, for it sometimes happens that three generations of warriors are buried in one mound. At the top of the barrow the skeleton has been found stretched out horizontally, with remains of iron instruments; in the centre, cinerary urns filled with calcined bones and bronze neck-rings, hair-pins and knives; and

at the bottom a body bent up, with the knees joining the chin, together with stone implements and common pottery." That is to say, in the stone age careful burial in a sitting posture; in the bronze age, cremation; and in the later age again, burial, but more careless, in a recumbent position. The same modes of sepulture have been observed among the mound-builders and other constructors of tumuli in America.

Different sizes of funeral urns, somewhat differing in finish, have been found in barrows. The earliest were evidently shaped by hand, as they are marked by nail scratches; but those of latest date sometimes show traces of lathe-work or of having been fashioned in a mould. The largest generally contain fragments of bones as well as ashes. Beside them are usually placed small jugs holding a pint or over, filled no doubt with water at the time of burial, and spoken of as "drinking cups." Yet another shape, of much smaller size, called "incense cups," absurdly enough supposed to have held perfumes, but which were much more likely to have been receptacles of materials for making fire, such as dry moss that would long ago have crumbled to dust. So the dismissed spirit would thus be supplied with all it would want—arms, food, water, and fire—to speed it on its way to the other land. A point to which we would beg further observation by archæologists in this connection is—Were any but weapons of the chase usually placed in graves? Hunting is the recreation of the warrior, and in a savage state all men are necessarily warriors. Hence the significance of the articles placed with his body. He

was supposed to be going to happier hunting grounds—domestic implements would not be needed there, so to speak, and would not be appropriate when placed with warriors going on a journey. Individual instances to the contrary are insufficient to disprove the theory based on this fact, while the circumstance that, not industrial implements, but pins, beads, and gauds of jet and amber are found in bell-shaped mounds, supposed to be the burial-places of women, would tend to corroborate it. We do not remember to have seen this point discussed, but it is worthy of investigation. The placing of gauds in women's graves indicates that the popular mind admitted

Fig. 121. Incense cups.

that females too had a share in a future existence. It is considered that barrows ceased to be built in Britain in the eighth century after Christ. A surmise that chambered barrows are merely dwellings that the dead had occupied, heaped over with earth on their decease, is scant of evidence.

The erection of these early structures, whether of heaped stone or earth, shows that even in the initial period of the race men had acquired the habit of working in concert to carry out a design, and that they submitted to a certain degree of discipline, which is the basis of all society and by which alone any one idea

becomes general and information and skill diffuse among the mass. Further, as these structures were erected, not over every individual deceased, but to preserve the memory of noted persons or events connected with them, they show that the race had arrived at a degree of sentiment and established a standard of admiration that recognised pre-eminence. Comparison of the relative magnitude of cairns and dolmens beneath which a single corpse is interred, affords a kind of clue at once to the comparative fame of the deceased, and to the numerical strength of the assembly by which the monument was raised.

Single rude columns or standing stones were later than cairns or mounds, although some must have been set up before mound-building ceased. The same substitution of main strength for mechanical power that enabled untutored men to raise blocks weighing many tons to an elevation of several feet on the cromlechs, was required to lift into an erect position those ponderous pillars of unhewn rock known as standing stones, or Menhirs. Here arises interesting speculation as to how a race without tools of metal could quarry enormous slabs from their bed and move them to the spot where they were erected. Clearly they were placed with like intention as modern obelisks are set up on fields of battle to commemorate victories. The Scotch name "cat stane" (from the Celtic word *cath*, battle), and the Norwegian "bauta stein" (battle stone), indicate their intention. Were religious observances held around them? Possibly; but the chances are against it. Among savages, personal bravery has ever been the claim to

chieftainship; and these monuments were raised to perpetuate deeds of renown done by chieftains in whose prowess the people who raised them felt they had a share. Nothing more natural than that they should hold festal celebrations on anniversaries of the great event on the spot where it was symbolized in stone. As the renown became exaggerated by repetition, and hazy as the monuments themselves grew venerable from passage of time, popular myth might be exalted into a mythology with its superstitious rites, but no concurrent evidence shows it in the stone age. Festal gatherings in connection with sepulture and sepulchral celebrations would be no new thing. The buried or cremated dead were always interred with some degree of ceremony. M. Lartet discovered in front of the burial-cave of Aurignac, in the department of the Haute Garonne—the oldest known place of sepulture, and believed to have been used for that purpose prior to the pluvial period — convincing signs that funeral feasts accompanied the depositing of the dead and the "rolling of the stone to the mouth of the sepulchre." Besides surface burial, caves were used as receptacles for the dead at an early era. Scripture shows that in traditional times certain caves were set apart for burial. Abraham purchased the cave of Macpelah for a family vault (Gen. xxiii.).

Menhirs usually stand alone, but frequently two or more in line or in group. Human remains are found under some of them, together with relics, indicating that they date chiefly from the ages of bronze and iron. Instances of monoliths having a perforation, most likely natural,

are known, to which the romance of legend attaches. One perforated menhir stands at Madderly, in Cornwall. Sir Walter Scott makes his heroine, Minna Troil, pledge her troth by clasping hands through the hole in the Stone of Odin, one of the Standing Stones of Stennis, in Shetland, the largest circle of menhirs in Britain next to Stonehenge. These stones of Stennis are arranged in two groups—one a complete circle, the other of about eighty columns, 12 to 15 feet in height, arranged in shape of a horseshoe. The great circle of Stonehenge has been so often described that it is unnecessary here to portray it. Its description is given in its name, *Stanhengist*, "uplifted stones." When perfect, it comprised 650 columns, with connecting architraves, in an outer and inner circle, the whole covering twenty acres of site. Evident marks of metal tools on some of the outer stones bring the date of that part of it almost within the reach of history. Perhaps King's *Munimenta Antiqua* is not far wrong in assigning the date of its erection to the period when Druidism was beginning its struggle with Christianity. Numerous sepulchral mounds of date older than itself are in the immediate vicinity of Stonehenge. Vastly larger than the British work, the Standing Stones of Carnac, in Brittany, stretch for more than two leagues in eleven parallel lines, comprising 3,000 menhirs, 18 to 20 feet in height, with several thousand of lesser length. The origin and intention of this stupendous work are alike lost in fable. On the heath of Lanvaux rises a forest of 120 standing stones, and on the headland of Penmarch neap tides disclose the

heads of submerged menhirs. Formerly all circles of stone were supposed to be of Druidical origin, till it was remembered that the symbol of the circle was as common to the worship of Odin and other faiths as to the Druids. Such structures had clearly a more complicated meaning than mere complimentary memorials.

Fig. 122. Standing Stones of Carnac.

The mode of sepulture by burial, practised throughout the whole of the stone age, continued in the bronze epoch, but in smaller chambers. Raising a mound over each individual dropped out of use, and several were laid in one tumulus, each in a stone chamber just large enough to hold the body seated. As the age advanced the cham-

bers were roofed with beams of wood instead of slabs of stone; but most of these have decayed, and allowed the soil to fall in on the bones. Later, we come on recumbent skeletons in coffins of oaken logs. Generally, an ox-skin was spread on the floor under the corpse, and on it were placed the weapons and relics that usually accompanied the dead. Meantime the fashion of cremation was growing, until in time it partially superseded burial. Thus there were two distinct funeral periods in the bronze age—that in which bodies were buried, and, later, that in which they were burned, the calcined bones being wrapped in cloths or the ashes inurned. Some of the urns were of graceful shape and well baked. Funeral feasts were still kept up.

Some years since the important discovery was made in Jutland of the body of a man, believed to be of the bronze age, who had been buried in his ordinary costume of coarse woollen cloth, consisting of a woven cap of wool, a wide cloak about a yard in length, with a skirted undertunic drawn in at the waist like a kilt, also strips of stuff that seem to have been leggings, and fragments of leather from coverings for the feet, besides which a bronze sword, the whole equipment bearing some resemblance to the dress of the Scottish highlanders (*see* fig. 124). About the same time another interesting discovery was make at Lubec, in Germany, where a burial mound, 14 feet in height, was removed layer by layer, and disclosed that the sepulture of the three ages, stone, bronze, and iron, had taken place in the same mound. On the top was a buried skeleton, with some

objects in iron; at half-depth of the mound were several sepulchral chambers with calcined bones and a bronze knife; and underneath all, at the base, a tomb of the stone period, containing buried bones and flint hatchets. This continuance of sepulture at long intervals during countless ages is not extraordinary, for honoured dead might be entombed for greater sanctity in venerable monuments.

Fig. 123.
Woollen cap: Bronze Epoch.

Fig. 124.
Coat: Bronze Epoch.

During that early part of the age of iron to which the present treatise refers, cremation and earth-burial were still contemporaneous, though cremation eventually came to prevail. In some places a singular fashion had arisen of burning only part of the body, and arranging the calcined bones, ashes, and votive offerings in the tomb with an eye to display. This was the case in a number of tombs examined at Hallstadt near Salzburg, in Austria,

dating from the earlier part of the iron age, and by which much information was imparted as to the manners of the epoch. In a thousand graves opened, half the number of the dead had been buried, and the remainder either wholly or partially cremated. In burial places in Savoy the same modes of sepulture were observed, and some charred arm-bones were encircled with bracelets. Trinkets of various kinds were found with the dead, including, besides ornaments of iron-work, glass and enamel, showing that commerce had already led to importation of luxuries from abroad. During the later traditional part of the iron age, and in the historic time succeeding, cremation of the dead became universal among many peoples.

Sepulture is closely connected with religious superstitions. Whether the people of the stone age did or did not have a recognised faith beyond a belief that the famous dead, if not all deceased persons, continued to exist invisibly in some far pleasant country, is a matter on which no data exist to base an opinion with any degree of certainty. Deification of heroes could not have arisen in that age, notwithstanding that noted persons of the stone epoch had monumental structures erected over them as a visible mark to recall their names and prevent them from slipping out of general remembrance. These petty chieftains of flint-arrow wars or local athletic deeds could not have impressed any large number of mankind sufficiently to cause them to be regarded as more than mortal. Besides, it is not in a torpid condition of mind such as that of the stone age that fancy

would stretch so far as to account for the wondrous by inventing the supernatural. Unless it might be a vague wish to conciliate the powers of storm and tempest, primitive man, in the first of the three ages, could have had no definite idea of worship. The total absence among stone relics of anything that would seem to have been an idol—the total absence of visible symbol—is almost conclusive that they had no materialized form of

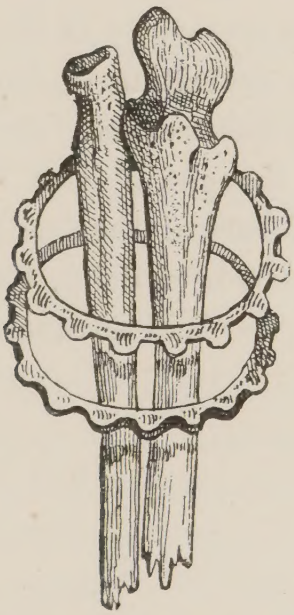


Fig. 125. Braceleted fore-arm.

religion to symbolize. When metal-working, accompanied by the activities of commerce, had aggregated the small communes into races, the case was different. The action of heroes was then on a much larger field, more terrible in execution and affecting large numbers of the race in times when the general mind had advanced to a stage where it was liable to be carried away by excite-

ment. In the wild forays and storms of fury that broke from the north, the element of terror would be evoked in those who witnessed them or heard of them. Exploits otherwise inconceivable were attributed by the common mind to power and daring more than mortal. They must be beyond nature—supernatural—the action of gods. Hence deification and the heroic religion of the iron age. Mythology came in with the reign of the sword.

The paganism of Asia, in a lesser degree that of Egypt, and graceful earliest mythology of Greece, are all subject to this rule of the deification of heroes. The theme is beyond the scope of this treatise. Strange, however, and affording food for thought, if with a universal care in providing for the future of the dead there should have been no personification of a deity, until civilization had not only been born, but had advanced along many pathways of life.

CHAPTER XVIII.

FOSSIL MAN.

Scope of the Inquiry.—Table of Comparative Brain Power.—Human Remains found at Bize.—At Aurignac.—In Belgium, the Engis Skull.—At Dusseldorf, the Neanderthal Skull.—Dordogne.—Bruniquel.—Souletré.—Trou du Frontal.—In Kitchen Middens.—In Lake Dwellings.—In Mound Buildings.—Few Remains in British Caves.—Peculiarity in Shinbone and Humerus.—Remains of Fossil Man show no Difference of Structure or Appearance from Existing Race.

COMPARATIVE anatomists are the authorities competent to deal with the study of Fossil Man and to draw inferences therefrom, and in so doing are apt to bring on themselves the charge of materialism. Setting aside mere questions of date, the issue desired is whether man in all eras of his race had a physical identity with ours, and, resulting from it, a like mental capacity with ours? This is on the assumption that a certain size of brain, as shown by capacity of cranium, represents a given degree of mental power as estimated in relative figures of proportion.

From this point of view comparison of skulls from different localities is interesting as throwing a glimmering of light, more however on the physical than on the intellectual capabilities of the persons to whom they

belonged. The chances are against the first half-dozen heads that come to hand in a prehistoric ditch being typical examples of the race or throwing reliable light on the cultivation the people had reached or were capable of reaching. It has been said that among the crania in any modern city graveyard skulls would be found varying all the way from the brutal head of an idiot or blood-craving ruffian to the "dome of thought" of a Shakespeare or a Newton. It is roominess of head for mental capacity that can alone be judged, not whether the mere possession of such capacity would produce effects. Besides, fineness of fibre has as much to do with intelligence as roominess of skull. At the same time sensitiveness of fibre and intensity of electric or other brain force being equal, larger dimensions of brain may be supposed to give greater intellectual reach, and even to supply a more animating support to muscular effort. With these reservations the following table, if correctly compiled, is of interest. It was published in the *Revue d'Anthropologie* in 1882, and has been since amended by M. de Nadaillac and other *savans*.

Crania examined of	*Average Cranial capacity.*
Laplanders	1585 c.c.
Gauls	1552
Cave, neolithic period	1543
Souletré, palæolithic period	1525
Basques	1527
Savoynards	1494
Chinese	1486
Bas Bretons	1479
Japanese	1473
Merovingians	1465

Crania examined of	*Average Cranial capacity.*
Parisians of twelfth century	1449 c.c.
Polynesians	1449
Arabs	1447
Sclavonian Croats	1433
Aleutian Islanders	1409
Esquimo of North-Western America	1401
Modern North American Indians	1359
Australian aborigines	1337
Nubians	1329
Hottentots	1317
Mound-builders	1276
Greenland Esquimaux	1250

This table is defective in that it does not give the comparative capacity of the average Caucasian skull, and (perhaps from some of the crania chancing to be of minimum measurement) the estimate which places lower than the Hottentots and Australians a race that erected mathematically designed earthworks and fashioned portrait-pottery may be subject to re-computation.

As long ago as the year 1828, human bones were found associated with those of the auroch and reindeer at Bize, in the south of France, and others with bones of the rhinoceros at Nismes, but they escaped critical investigation. About 1852 a burial cave was discovered at Aurignac, in the Haute-Garonne, France, containing with vestiges of mammoth the bones of seventeen persons, including several perfect skulls; but unfortunately the relics were re-buried in a crowded churchyard, and they too were lost to science. The remains are vaguely described as having been of small stature. Some doubt is thrown on these mixed bones having been all of one period.

Belief that man and the mammoth were cotemporary gained ground but slowly, until in the year 1833 a skull (fig. 127) belonging to the palæolithic age was discovered by Smerling in a Belgian cave among flint implements and bones of rhinoceros; and a fragment of skull of a very low type was found, in 1857, in the valley of the Neander, near Dusseldorf. Both of these excited much interest, and are still referred to in disquisitions. That from the Neanderthal is marked by enormous superciliary prominence, and by great retrocession of the frontal bone.

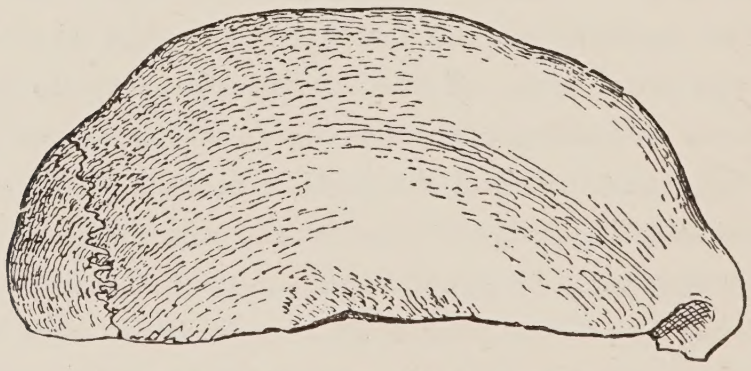


Fig. 126. Neanderthal skull.

It is now generally accepted that this skeleton belonged to a man of medium stature, of great bodily strength, but of a mental capacity little removed from idiotcy. Professor Huxley says it is of all extant human skulls the one most nearly approaching to the apes. We may readily dispose of it by imagining that it belonged to some wandering imbecile, whose body was washed into the deep ravine where it was found embedded in five feet of mud. It is unfortunate, however, that the first cranium of prehistoric man that came to the knowledge

of science should have been of an abnormal type, inasmuch as for years it misled ethnologists in the deductions they drew. The Engis skull is of a much higher cast, with no marks of inferiority. Huxley says of this relic, "It is, in fact, a fair average skull, which might have belonged to a philosopher or might have contained the thoughtless brain of a savage."

In 1868 portions of human skeletons were taken from the drift near Paris, among them the complete skull of

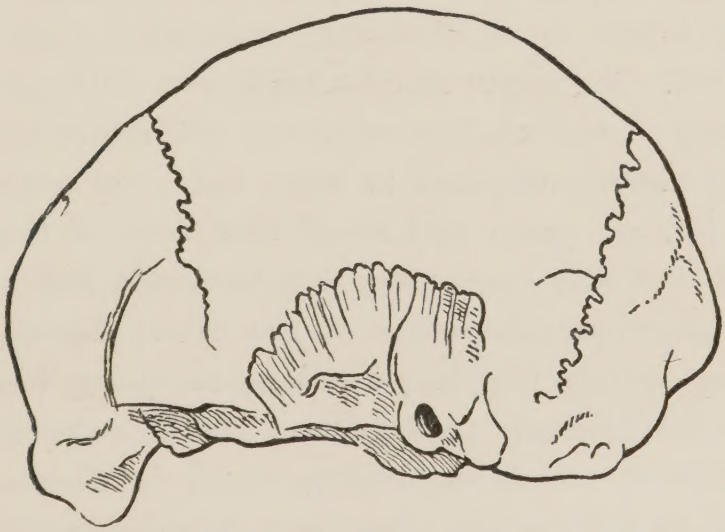


Fig. 127. Engis skull.

a woman, of an unintellectual type, narrow and slanting. Caves have not been prolific in human remains, but, also in 1868, skeletons of a very old man and a woman were found in the cave of Cro'martin, Dordogne, the man nearly six feet in stature, the woman tall in proportion, and both with heavy frames and skulls rather elongated but of fair capacity. Their features were broad. The woman had been killed by the blow of a flint club. A

number of fragments of skulls have been picked from beneath a stalagmite floor in the cave of Bruniquel, near Montauban, France. They show no marked degradation. From the celebrated station of Souletré, Soane-et-Loire, an ancient burial-place on a hill-side, numerous skulls have been examined, showing, on the whole, a type approaching the modern Laplanders and Finns. For years explorations have been carried on in Belgium by the Government. In the Trou de Frontal, a supposed burial-place of the reindeer period, a few skulls, sufficiently intact to be examined, were more round than elongated. No human remains are known with certainty to belong to the kitchen middens; but skulls found in Danish tumuli, supposed to have had some connection therewith, are small and round like those of the Laplanders, but with more retreating foreheads and greater prominence over the orbits of the eyes. Remains are wanting among the lake-dwellers, excepting bones of children accidentally drowned, and one fragmentary skull (the date of which we doubt), which is described as "allied to the cranial forms now prevalent in German Switzerland." In 1872 was found by M. Rivière, in one of the caves near Mentone, in the Riviera, the complete skeleton of a man associated with flint implements and bones of the cave-bear, rhinoceros, urus, and hyena. The skull was elongated, with a somewhat narrow forehead, stature about medium height. In 1873 the same explorer found in an adjacent cave three more skeletons, two of them of children, the other of a strongly-built adult man of medium stature and of no inferiority of

cranium. Dr. Paul Brocca, of Paris, who has made a specialty of examining the bones of the cave-dwellers of the south of France, has arrived at the conclusion that these people were a taller race than Frenchmen of the present day. Few human bones have been found in British caves; and they have not added much to our knowledge of the *personnel* of the aforetime dwellers therein. Relics of fossil man from America, including the mound-builders, all have characteristics allying them more or less with the type of the American Indians of the present. Several of the skulls, from both continents, but especially those of Europe, exhibit fair intellectual shape; but outline profiles convey so faint a conception of the relative brain room that it is unnecessary to encumber our page with illustrations.

It would be as absurd to assign an average of stature or of feature to the men of prehistoric times as it would be to assign an average of the altitude and expression of the race of to-day. Skeletons from ancient burial-places vary as much as do present individuals and nationalities. Common minds are easily confused by science pointing out some slight difference in a bone, say an angle or depression; and, by the unlearned, the matter that requires hard words to explain is exaggerated into a supposed organic difference. A national physiognomy, for instance, is an intangible thing, yet we expect to see it in tribal communities, and do see it at a glance without laboured explanation. So it is with the osseous framework. Says Vesalius, the father of anatomy, A.D. 1543, "The only natural form of the skull is that of an

oblong spheroid compressed at the sides and prominent before and behind;" and Lavater, the physiognomist, adds, in 1775, "Take a man of the commonest understanding to a charnel-house, and make him attentive to the difference in skulls. In a short time he will either perceive of himself, or understand when told, here is strength, there weakness, here obstinacy and there indecision. . . . Herodotus says it was possible, many years afterwards, to distinguish the skulls of the effeminate Medes from those of the manly Persians, and I think I have heard the same remark made of the Swiss and Burgundians." Suffice it for us, that in the osseous remains of man that have yet been discovered, no organic difference is seen since he first appeared in the world. His head, trunk, legs, and arms all have borne the relative proportions they do now; and if any trifling individual characteristic is noted, it is a mere detail such as one would see among an equal number of living acquaintances, for nature never identically reproduces herself. So far as bone remains can give testimony, the race of man from the earliest has been pretty much as it is now. Art, by its portrayals, lends a verification for the past three or four thousand years, during which no change has taken place in the pictorial representation of the human animal. Stanley's African dwarfs and a platycnemic tibia and perforated humerus may interest evolutionists, but do not affect the question of general structure.

Reviewing the few remains of corporeal man that have been collected from prehistoric times, enough has been observed to show that even earliest man possessed the

capacity for improvement; but his surroundings in the stone age were not favourable for its development. That his intelligence expanded during the three thousand years or so that are called the age of bronze, the handiwork attributed respectively to the beginning and end of the period proves. As regards the prehistoric race of the iron age, immediately antecedent to our own, M. Figuier sums up the case by saying, "Both the skulls and the bodies of the skeletons found in the tombs of the iron age point to a race of men entirely identical with that of our own day."

CHAPTER XIX.

MYTH.

Not the Invention of Early Man.—Myth distinct from Mythology.—No Idols found in Stone Age.—A Visible and an Unseen World recognised from Earliest Times.—Myth of Transformation into Stone.—Of Barrows, Cromlechs, and Monoliths.—Of Giants.—Why some Supernatural Beings were Dwarf.—Myth of the Mastodon.—St. George and the Dragon.—Trolls that live in Tumuli.—Cave-dwellers.—Lake-dwellers.—Fairies and Elf-bolts.—Field for Research is wide.

ALL myth is modern. The lapse of a long time is necessary to utterly blur the details of an occurrence known to a whole tribe. As Nature imperceptibly moulders away the angles of a neglected tower, covering it with ever-increasing masses of verdure, until it assumes new outlines yet retaining a vague but greatly enlarged resemblance to the original lines, so do actual hard facts become magnified by the mosses of eld.

This is no place for psychological discussion, but the mere savage is stolid. The objects he is acquainted with are confined to a very limited number. Not having the necessary starting-point of accumulated knowledge, he cannot conceive objects or notions beyond his own personal experience. Hence his imagination remains

contracted, or rather, he possesses none at all. Imagination can never be stirred unless by a diversity of life-surroundings. The child of to-day, it may be said, possesses imagination in an eminent degree, but it is petted and chattered to, and allowed to run about at will among a succession of civilized friends, and in consequence the self-instructed little one tells impossible stories to its nurse; but all its fancies, if carefully analysed, will be found to be nothing more than a grotesque combination of things it has become acquainted with more from hearsay than observation. The mere savage has no such stimulant to his intellectual powers in his surroundings. In the early stone age there could have been no generally accepted myth.

Neither in the later stone age were the circumstances greatly varied. That was the age of cairns and tumuli, requiring the association of numbers of men to build them. Such association would tend somewhat to enlarge the range of ideas, for notable events must have occurred, to commemorate which they were building. The events were too fresh in memory for immediate myth to attach to them. There must have been lapse of time and great enlivenment of fancy before the popular mind would break out in romance; for myth is, after all, but early epic. A certain degree of development is required before imaginative narrative can strike the people, and a longer time before it pervades them. The later stone age, we may assume, laid a foundation for the growth of myth, but possessed none.

The men of the later stone age had themselves built

the tumuli, erected cromlechs and monoliths, and continued to build them until the improved conditions of life which we call the Age of Bronze had spread and become general. With the cessation, or change, of monumental works of the old type, forgetfulness of detail would gather round them. In the later age of bronze, memorials of the long antecedent age of stone would have become works of antiquity. Then followed the Iron Age, which drew a line between the then present and the past, and set out with new habits, new aspirations, and new opinions. Vestiges of what would be considered as an inferior past would be neglected, and their history become fabulous. It is quite in accordance with human nature that names and deeds at first handed down with accuracy should by frequent repetition in more stirring scenes grow exaggerated, distorted, and indistinct. Here was myth proper from the middle time of working in bronze.

Active metal-workers, assembled in many small centres of industry, are not, however, the persons one would expect to busy themselves with the memory of a rude past. To those who resided more or less permanently among the memorials may be attributed the want of care in preserving a truthful remembrance. The common mind must have retrograded when the supernatural (which is synonymous with the incomprehensible) was called in to account for the monuments around. Imagination, too, must have gained in activity since the stolid hunting times, and have become open to wonder. Writers of weight have advanced, that myth was born of

an inherent proclivity in the human mind to deify the objects of its admiration. On the other hand, some have said that it arose mainly from a propensity in rude minds to invent exaggerations. We venture to take issue on both points. Any cultivated person whom chance has brought in friendly contact with the vulgar of a rural type must have been struck with the evident good faith yet utter want of consequence with which they will depart from the strict details of a narrative, but with no intention to mislead. This is quite different from intentional exaggeration, and far removed from a design to hoax. Nor is the assumption that untutored man itches to deify his heroes more tenable. Negative evidence leads directly the other way. As we have already mentioned, a notable feature in the study of Early Archæology is, that among the relics of the stone ages no idols have been found. Cave-dwellers felt no need of lares and penates. Had mankind of the period impersonated their deities, they would have materialized them in visible shape; but the action of mental childhood seems to be to clothe striking qualities or events with vagueness, not to impersonate them. Whether this fact can be brought in support of the theory, that the idea of an impersonal deity is inherent in the human breast, it is for theodicy to determine. Not till after a long time and on a palpably lower plane of mind do shadowy attributes (continuing to be exaggerated by fancy) become concrete, and man materializes his god. Then, and not till then, did crude fancies and grotesque imaginings condense into forms that were equally fanciful and grotesque. The hideous

idols of India and Egypt are examples. When materializing has once begun, and when the worship of fear is given to visible or invisible objects not comprehended, the extent to which it may be carried is appalling. Nothing exists to show that prehistoric man, earlier than the Scandinavian, was affected with this. It is well, however, neither to reject nor to hold a dogmatic opinion on the early transformation of myth into mythology, nor does it come within our present theme. While mythology is an allegorical system of theology, myth is a relation of supposed facts.

The process of fable growing up around fact and distorting it into myth is tersely described as "the endeavour of barbaric man to account for his surroundings." In this process, *possibility* is not an essential of belief. Lacking this element, however, quaint beliefs have grown into folk-lore, not yet weeded out from many secluded parts of the world, notwithstanding that the tone of the present age is sceptical. Some of these folk-customs have a curious but unwitting reference to the habits of the race of the stone age. All are based on a primary belief in the existence of two worlds, the visible and the invisible. In the beginning of myth the two are so closely interwoven that the difference between them is mainly that the one remains constantly before the eyes, while the other is only occasionally disclosed. When beings from the unseen appear, they bear a kind of resemblance in person to the human race. They are indeed but men travestied, and show like passions, occupations, wants, and even like love of dress. The singu-

larity is, that myths have deviated so little from their original type and have been current so long that they have run into a groove of quasi-authenticity, and have gained credence among the unlearned in all parts of the world.

When the mind of a savage attempts to personify great strength, it unconsciously associates that quality with great physical bulk. The conjunction underlies all heroic myth, as well as deification in general. Hence, naturally, heroes of long antecedent time, whose real deeds were forgotten, become in popular story giants strong enough to have erected by their own unaided strength the stones of cromlechs or set on end the monoliths. Huge boulders of the glacial period that lie about on wolds were supposed to have been used by heroes in hurling at each other, or in playing quoits, which goes at once to prove the antiquity of that game and a belief in abnormal strength. Anticipating a superstition that obtained in the much later classic times, shades were supposed to haunt the places of their sepulture. "Their voices were heard on the breeze," and poets have been provided with the simile of the wailing of unburied ghosts.

While the idea of giants arose from the want of any other way to account for the erection of huge monumental stones of forgotten origin, dwarfs owe their invention to another fancy. Many of the *cist vaens* (stone coffins) in chambered burial mounds were short, not more than four feet in length, into which limited space the body had been bent and packed. Stalwart shepherds comparing

these receptacles of the ancient dead with their own stature, came to the conclusion that the people buried there were a race of pigmies. Hence the fancied shades of these dead in the unseen world were supposed to be still dwarfish, and when they did appear to men were of diminutive stature,—under various designations.

Cromlechs were generally reputed to be still inhabited, and haunted by the ghosts of those interred there, which it was averred were of full human size, somewhat hazy of outline, but had been seen of many, and even heard wailing. Whoever has had the experience of losing his way on a moor at midnight, with clouds racing over the moon and throwing fitful and flitting shadows, while the wind wails through the stones, will not wonder that the ignorant fancy they see the shade of the hero buried there. A cairn is even a more deceptive place of shadows, and more ready to produce the impression of mysterious beings lurking near. In late times, when a mythology had been established, it was believed that the gods had the power of transforming persons into pillars, as happened to Lot's wife and to the giant Ardfind, whom Olaf turned into a standing stone. The 3,000 standing stones at Carnac, in Brittany, are said by the guides to be an army of Cæsar's transformed into stone. A much earlier belief was, that the stones of Carnac were placed there by supernatural beings called the Gorics (Korred), about three feet high, who brought the blocks from a far distance in their hands, and set them on end, the object being to confuse seekers after a great treasure that is buried under one of them—for the Gorics were expert

miners and gold-workers. These are the gnomes of eastern fable, more allied in myth to the northern hoeg-folk than to the beings that dwell in barrows, yet their derivation is the same. When modes of life had changed, and possession of land had become tribal, perhaps individual instead of collective, it seemed a mystery to later generations how great mounds had been constructed in waste places. By a freak of fancy this was attributed, not to the giants, but to gangs of working beings other than human; namely, dwarf "earth-men." Pursuing the idea, these labourers were supposed to dwell in the mounds they had erected, and credulity fancied it often saw them entering and issuing. Following existing folk-lore as our guide, lights are imagined to burn at night in the chambers of the burial tumuli, originating as we may surmise from materials for making fire being found with the dead. The sound of smiths hammering in the tombs is traceable to implements of bronze being found therein; and the myth of lights in the barrows and accompanying sounds of revelry may be set down to the vulgar fancy associating festivity with lights. These "earth-men' are almost identical with "trolls" and the Scandinavian "bjerg-folk." The "hoeg-folk" were imported goblins, inhabiting caverns in the hills lying south of Scandinavia, and doubtless were a misty reminiscence of the cave-dwellers. Even the lake-dwellers contributed a share towards the stock of myth. There is no doubt that many traditionary legends that have sprung up along water margins owe their origin to some misty reminiscence of these people. For instance, near Brecknock is a small

lake wherein no islet breaks the smooth surface, yet the rustics of its neighbourhood tell there is an island there built on piles, and inhabited by the Tylwyth Têg, a kind of fairies. When the astonished tourist declares he sees nothing, it is gravely explained that the residents thereon, having taken affront at some slight put on them by mortals, have withdrawn their settlement from observation, but it is there all the same. It might be curious to investigate whether an actual lake-settlement was ever on that piece of water. Perhaps another legend may be traced. A huge, nameless, and almost formless beast is thought to wander in lonely glens and morasses of Scotland, Ireland, and Germany,—may it not come from the story of the mastodon? Were it not that folk-lore has almost died out, more than one domestic rite might be traced back to the stone age. For example, placing a plate of salt on the breast of a corpse, as was done in the wilder highlands of Scotland within the present generation, and also the pretty every-day affection of burying a child's toys with it, evidently have relation to the placing of food and trinkets with the dead to comfort them on their journey to the unseen land. Beltane fires, too, that were wont to be kindled, within remembrance, on festal occasions in the northern part of the kingdom, may have come down from festive and funeral tribal gatherings with their camp fires in the stone age, before paganism turned them into the worship of the sun.

Fairies in myth were an offshoot from the trolls, yet it is difficult to trace their personality to anything in the

history of primitive man. Perhaps it was natural, when the credulous thought they had seen the malign trolls and yet no harm had ensued, to come to the conclusion that there must be two classes of these beings, the malignant and the harmless. The latter likewise would live in mounds, but mounds of pleasant greensward, not in tombs. So at least fancy painted them. Every English child has heard from its nurse that there are good and bad fairies, so it must be the latter who, unseen, shoot actual flint arrows of the neolithic period to inflict injury on the cattle of persons who have offended them. So it is believed in the country districts of Ireland. In an early Anglo-Saxon poem these same arrow-heads of white quartz are spoken of as æſa ȝeſcoc and ylfa ȝeſcoc, the arrows of the gods and the arrows of elves, showing that even at that early date they were regarded as of such remote antiquity that their origin had been lost sight of. The same remark applies to celts, which are still regarded with a degree of awe by the ignorant. In some parts of the Continent, and it is said in South America and in the East, they are thought to be thunderbolts, and to have fallen from the skies. Quartz arrow-heads, too, have some occult influences attributed to them. They are supposed to have virtue against rheumatism, and are sometimes worn as a charm.

If one may venture a surmise as to when these myths among others developed, we might say they had assumed shape during Druidical times, and, from several faint allusions in them, had expanded since the Christian era.

Guarding against being misled by apparent coincidences where none may exist, the tracing of the origin of popular myths back to the remote antiquity of the stone age is full of interest, and opens a wider field than might be hastily supposed.

CHAPTER XX.

ART.

Hypothesis that Primeval Man had a Taste for Art.—Fallacy of this —How Progressive Taste may be traced.—In Adornment of Person.—In Ornamentation of Pottery.—In Embellishment of Arms. —Pictorial Designs found in Caves.—Carving.—Had no Effect on General Taste.—Portrait-pottery among the Mound-builders.— Bronze Age did not improve the Condition of Art.—The Iron Age.—Sculptured Stones.—Conclusion.

MUCH subtle hypothesis has been wasted in seeking a reply to the question, "Was a taste for Art inherent in primeval man?"—a query at once vague and misleading. Stress has been laid on finding in the oldest caves of Southern France several outlines of animals incised in bone (not superior to similar work observed among the North American Indians when their history was first recorded), and the inference has been too hastily drawn that these pictures show a taste for and a skill in Art, from which the race of early men afterwards retrograded.

The artistic faculty can be not unclearly traced among any community by observing its disclosures in three paths; namely, personal adornment, shape and embellishment of implements of use, and in works of Art proper. These last-named may be either imitative or imaginative

—the latter covering and idealizing the former—but the few works of early man that have come down to us are wholly mimetic, and none of them planned by imagination. Copying, however, by gauge and measurement is an effort of mechanical accuracy, and can only by compliment of speech be called Art. When the form and qualities of an object, animate or still, are so strongly imbued in the mind, and through the mind impressed on the retina of the eye, that they can be reproduced with recognisable exactitude on a plane in absence of the model, the first step in the stairway of Art has been ascended. To this height (in a stumbling way) early man, through the vast period from his origin to the beginning of the Iron Age, reached, but no higher.

The first inception of ornament, that is to say (loosely speaking) of Art, awakens new sensations, not shared by the lower animals, as far as man can divine, and thus drawing a broad line of distinction between him and the inferior creatures above whom he was created or from whom he was evolved. This would indicate that among men's latent faculties is one which circumstances may develop into a power of seeing beauties where an uncultured eye sees none. There is much similarity in the development of the mind of a child and of an individual savage, or of a whole savage race. Nurses observe that *angles in connection with colour* first attract the infant's dawning perceptions. Red corals and coloured fragments of potsherd are the earliest objects the infant will stretch out its hands for. Afterwards it is attracted by curves, and later by a combination of curves and angles.

Appreciation of the symmetry of form does not come without special culture. When the child has attained school years she dresses dolls in *rococo* gauds, or, if a boy, scrawls unintentional caricature on his slate, or carves dogs' heads on his slate pencils. This description applies equally to the Art progression of any barbaric race.

One of the earliest instincts of both sexes, even in the most primitive times, was the adornment of the person. Relics of supposed ornament, through all stages of costume, have been found by archæologists. It might be imagined that a careful comparison of specimens recovered from various localities and of different dates would give an outline history of the growth of taste ; but it does not. The monstrous dresses in which the female sex have arrayed themselves in all ages cannot be taken as showing progressive improvement in artistic culture. In earlier epochs before fiats "what to wear" issued from Paris or elsewhere, personal adornments merely indicated somewhat of amelioration of manners, and not increased delicacy of choice. Trinkets recovered from the older caves are very barbaric, chiefly animals' teeth and bones strung on sinews of meat. From that we come to strings of shells, a pretty custom that still survives. Glitter is the quality that most attracts the barbarian eye, as it does the eye of infancy. Hence pieces of rose quartz, jet, and amber were prized and worn as beads. Although the tendency of untutored taste is to overload, and the adornments from early times include chaplets, necklaces, bangles, bracelets, waist-belts, buttons, and brooches of bone for the apparel and hair, few are massive or elabo-

rate. Doubtless it was rather from scarcity of gauds than from delicacy of perception. Exceptions have been noted in necklaces, one of which was in four rows with 425 beads, found in a tumulus in Yorkshire, and a few others elsewhere with 300 to 400. The arrangement of these worthless treasures was no doubt the work of the women themselves following one petty *fashion*, arising from the vagary of the hour but disclosing no definite standard of taste.

In the plastic material of clay, so easy to be wrought into form, many articles might be expected to have been imbued with creative taste, had the fashioners had the skill to put it in shape. The reverse is noticeably the case. Pottery in Europe remained throughout the prehistoric centuries as clumsy as ever, although a little better baked. During the whole of the stone age its ornamentation, as we have seen, was mainly a combination of straight scratches and dots. It never got beyond the arrangement of these symbols until the bronze age slightly improved on them by introducing rings and chevrons with a vandyked edge. The mound-builders of America, whose pottery may have been contemporary with later Egyptian, excelled, as we have seen, the European races in ceramic art, and showed not a little skill in design. The forms of their urns were graceful, often with elaborate ornamentation, and with figures of animals serving as handles, with a decided leaning to the intentionally grotesque. Among the many pipe heads of quaint design that have been found, it is worthy of notice that throughout the number of pieces in

which human faces are represented a distinct type of physiognomy is preserved. Those given in the margin are, from their individuality, generally considered to be portraits. In fig. 128 the first countenance would be looked on as that of a pleasant person anywhere; the type of the second is unfortunately still to be met with; and the third has an Egyptian cast that is of interest. European pottery did not in prehistoric times attain this artistic height. We may accept the above representa-

FIGS. 128, 129, 130. Portrait pottery, mound-builders.

tions as average countenances of the time, for in truth all normal statuary, however idealized, is contemporary portraiture, and conveys an idea of the prevailing type of faces in the era when chiselled.

It is evident that in a very remote period of the stone age one man—perhaps not more—with a talent for drawing lived in the cave of La Madelaine, in Southern France. His sketches found there afford no proof that a taste for pictures was common in that cave. In fact, his works could not have been esteemed, otherwise they would not have been carelessly lost. To him we are indebted for

perhaps the earliest picture in the world (fig. 131). The cave-shelter being contemporary with the latest days of the mastodon, he gives us a portrait of that animal, drawn no doubt from the life, and cut in a slab of tusk,

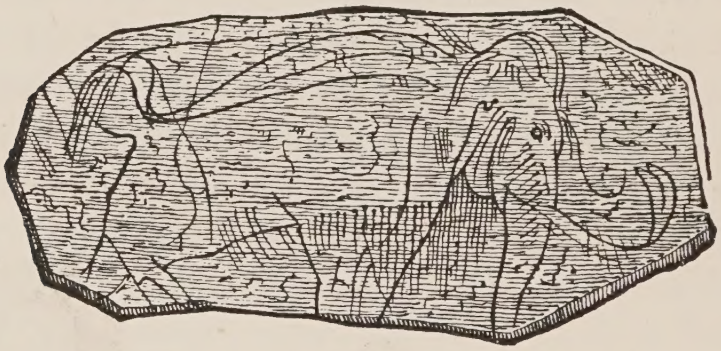


Fig. 131. Mastodon, cave of La Madelaine.

not, however, the only likeness of the giant beast that has come to us. From the flint burin of the same etcher we have what is called "study of an eel," but may rather be intended for the huge winged reptile, the pterosaurian.

Fig. 132. Pterosaurian, cave of La Madelaine.

It will be observed the human figure in this sketch is nude, as is the case in other stone age pictures. We recognise the same hand in the horses' heads. "A running reindeer" (fig. 133) is in the artist's later style, or by a pupil who excelled his master. The reindeer, in the

portrayal of which not much skill is manifested, was an object of the chase coming in about the time of these cave pictures. Massat cave likewise had an artist,—only one,—a better draftsman than he of La Madelaine. His

Fig. 133. Running reindeer, La Madelaine.

style is somewhat feeble and his lines thin, yet his outline (fig. 134) may be called fairly accurate. Designers of the cave period, however, must yield the palm to one

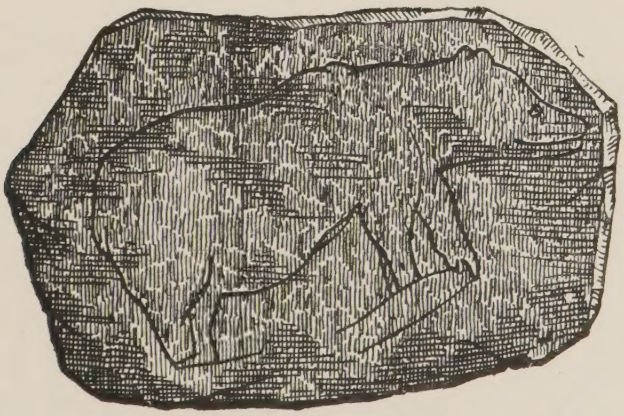


Fig. 134. Cave-bear, cave of Massat.

or more artists in the cave-dwelling of Thayngen, in Switzerland. Both the specimens, shown in the above cuts, were engraved on deer's horn. Fig. 135, an outlining of a fox and bear, shows a good deal of character. What

is considered the finest specimen of stone age drawing, "reindeer browsing," is here reproduced from the same

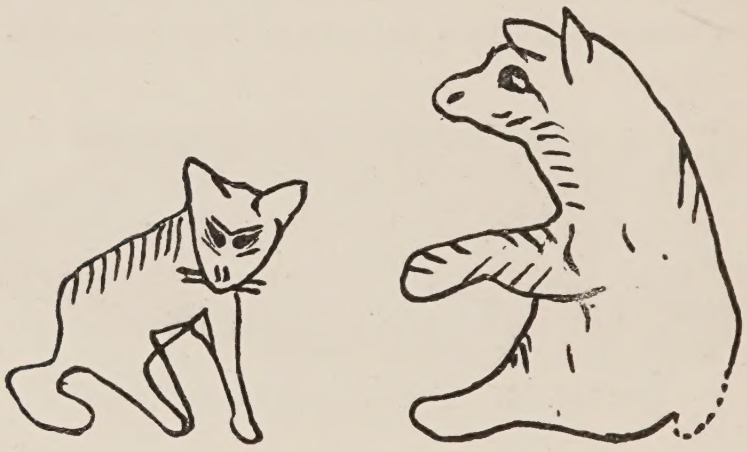


Fig. 135.

cave. The cave of Laugerie Basse was not without its sculptor, whether the same person with the engraver of

Fig. 136.

fig. 136 is not known, but a carved staff of reindeer's antler testifies to his skill. The carving is thought by

some to represent the head of a cave-bear; but it is not much like a cave-bear, and may have been meant for a mylodon.

When we know that one industrious artist can leave behind him a stack of pictures, it need not be matter of surprise if the few prehistoric remains that for want of a better term may be called Art were the work of not more than half-a-dozen persons. An experienced eye will detect the peculiarities of style in the most rudimen-

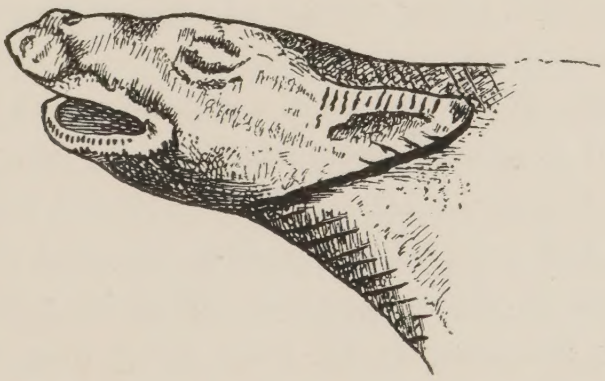


Fig. 137.

tary sketch as readily as an expert does the differences in handwriting. Not more than half-a-dozen styles can be detected in archæological art "finds" as shown by published engravings. Nothing is therefore more fallacious than to attribute to the cave-dwellers a general taste for Art from these few specimens. Modern advertising enterprise, that scatters coloured "chromos" broadcast throughout the land, may have the effect of awakening a taste for such pictorial representation, but the few miniatures of animals etched in caves could have had none.

If proof were wanting, it is found in the circumstance that in collecting museum specimens for an exhibition at Paris to illustrate the incalculably long stretch of the stone age, only fifty-one could be obtained showing any trace of pictorial design, and this in face of the fact that one or two hundred thousand stone-age relics must be in public and private collections. Throughout the whole of the stone age and greater part of the bronze, Art stood still at the "grazing reindeer" of the cave of Thaynger. The proof is emphasized by finding that up to about the middle, or later, of the bronze age ornamentation marks were in general mere scratches.

The public mind must be in a state of activity before it turns itself to general embellishment. To compare great things with small in Art,—the sculptures of Greece were produced and graceful surroundings adopted when every Greek had an active personal share in politics,—the Athenians, according to St. Paul, being ever avid after some new thing. The art pictorial of Byzantium and of the Italian cities developed in the intervals of wars when the general mind was excitable. People of the prehistoric epochs, on the contrary, at such time as food was in plentiful supply, must have led a most indolent life, alternating with spurts of wearying fatigue. Both conditions of existence were unfavourable to the growth of the finer perceptions. Isolated and nomad habits could not be responsive to the stirrings of sentiment.

The reason that individual draughtsmen of primeval times confined their drawings to figures of animals of the chase is not hard to find. The art student of the schools

in drawing from the round has to undergo drudgery in disciplining his mind to take in the relative proportions of the model, so that the traits impressed on the mental retina may unconsciously guide the hand in reproducing them when the visible copy is absent. Especially is this the case in designing on a flat surface, to convey the idea of roundness, and yet more so where a copy is made from the life, when the slightest motion of the muscles changes the expression. To acquire anything like a mastery of any one life class, the student must have continually before his visual eye not only one but many of the species to which he devotes his pencil, until, closing his bodily eyes, he can call up in his mind the exact attitude and expression a living model would take under any given circumstances, and so be able to reproduce it by what has become the inherent skill of his hand. With less prolonged and patient culture the pupil of the schools will find that *expression* (which is the life of Art) escapes him, and he will be unable to produce a satisfactory representation on his canvas. Now, the savage with a taste for drawing has none of these laborious preliminary studies to make before he becomes a delineator of animals. We will not say of "animal life," for that implies *composition*, a higher reach than he has ever attained. It is in simple figures that his knowledge is depicted, and with considerable accuracy. From the time he could walk and take notice of anything, he had his model before him. When old enough to go out with the hunters, he stalked his model, watching it for hours from ambush and noting its every motion and expression until it should come within

range, and at night he would see it in dreams. Thus would the result of the educated artist's protracted studies be attained by the savage unconsciously and without effort. And, therefore, Art among all savages is limited to the reproduction of one familiar model.

Carving is an art more likely to be attempted by untutored man than drawing. Schoolboys with their first pocket-knife have an itch for it. Sailors in long calms, prisoners in fortresses, and others with a superfluity of enforced leisure seem to take to it naturally. Very few instances of figure carving have been found among the relics of the old ages. Where implements such as staves, spears, and the like have been graven, it has been with mere lines, mostly on horn. Although the obdurate nature of stone prevented the exercise of the art, much might have been done in more manageable material had a general taste for it prevailed.

The Bronze Age did not improve the rudimentary condition of art in Europe. The impetus given to activity ran in a business channel, in producing and trading. There is said to be only one representation of the human figure extant from the bronze age (fig. 138), the figure of a woman carrying a trencher. Be it or not that this is the sole specimen, it gives the information that women's ears were then pierced for heavy ear-rings, and that the costume of at least one waiting-maid of the time was a short tunic and trousers of woven stuff, girt at the waist by a belt of beads. Although the horse, ox, goat, sheep, and dog had come in, we have no representation of them worthy of the name. Limners had no occasion to study

the traits of domesticated animals as the hunter-artist had of his quarry. In fig. 139 from the cover of a bronze vase a conventional style is apparent. Even had such art-attempt been generally diffused, it could but have developed into a stiff mannerism, akin to that of the

Fig. 138.

Oriental and Egyptian, had not a new influence traversed it. That influence was the bold and fiery spirit growing in the North, and of which the Scandinavians were afterwards the type.

Among a daring and warlike people a degree of reverence approaching to worship is given to the sword. It is

mainly from the hilts and trappings of swords that we gain an idea of the art of the early part of the Iron Age. These weapons had the utmost skill and rivalry that armourers could lavish on them. While in the bronze age sword-hilts were mere grasps of connected rings with a conventional scrollwork showing baldness of invention, bolder designs were now evoked and artificers largely improved in skill. Damascening was introduced to

Fig. 139.

beautify the blades. Trappings, equally of men and horses, were decorated with ornamental designs. Thus on sword-sheaths we find engraved the equivalent of coats of arms; the dragon and swan in the North, and the horned horse of Gaul in the South. Not many crested figures from helmets have been preserved, but many reliefs from bosses of shields, showing bold designs. Horse trappings were ostentatious, laden with metal-work. Fancy buckles on the principle still in use are many. Linked metal rings and chains were in common use. Keys to lock-fast places already showed a touch of the grotesque mediæval decoration of that article. The

whole round of life received an impetus, not omitting the department of female adornment. Iron is not the most suitable material for trinkets, yet attention was given to form articles of vanity. Gold began to be worked for that purpose, but, taking the average of such adornments, the artisans have shown more delicacy in hammering than in æsthetic design. As the age advanced improvement gradually crept in, for the progress of Art, though sure, is ever slow.

Sculptured stones, with or without inscriptions, belong rather to Letters than Art. The carvings on them assign a probable date to their erection, inasmuch as the sculp-

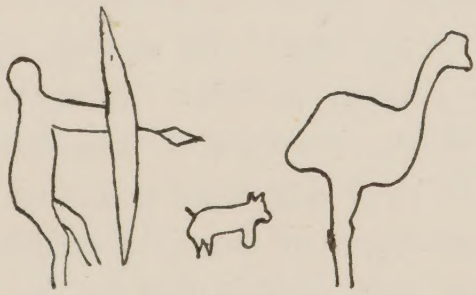


Fig. 140.

tors had attained to a knowledge of grouping, some of the monoliths in Scotland and Scandinavia showing compositions of men and horses executed with considerable spirit. As the lines must have been cut with metal tools, their era would be when the use of iron was general. Compare an attempt at grouping (fig. 140), from a sculptured stone in Algeria, showing that a dog of the turnspit breed was domesticated, also that the ostrich was known in Northern Africa, and was attacked with lanceolate arrows.

A question of some interest arises, "Were primeval men acquainted with any other art besides the pictorial—with music, for instance?" Here we have only hypothesis to go by. No relics of stone have come to hand that could be construed into any part of a musical instrument. The only specimens that surmise has supposed might be plates on which to stretch strings are certain small thin parallelograms of slate pierced with a small hole at each corner, more generally believed to have been wrist-guards or breast-plates. There was neither necessity nor likelihood that stringed instruments should be of stone. The twanging of a tense bowstring produces the elements of music. What more likely than that three or four bowstrings would be strung on a frame to produce rude musical sounds? A drum could be invented by a child. Whistles of bone have been found, but nothing to show any more powerful instrument of sound, although horns of the urus would produce a far-heard call and were indeed used by the Swiss as war-trumpets till recent times. Strong probability would favour the belief that early man did possess some kind of instruments devoted to lyric uses, and the rather that some such are known among modern barbaric tribes.

To sum up our remarks on Art. We have seen, as might be expected, that no trace of artistic taste either of embellishment or symmetry of form exists in the ponderous flint of the river drift. In the succeeding troglodyte time, of the many cave-dwellings examined, only three or four have produced a few drawings of animals on bone,—they being of the mastodon and reindeer dates.

The long remainder of the stone age shows no trace. Even when skill had advanced to working in brass or bronze, it remained singularly bald in pictorial design. Such facts do not typify a general diffusion of taste for Art among primitive man. With the introduction of iron came a larger number of artificers engaged in emulation against each other to supply the demands of commerce, and the greater activity of mind thereby engendered produced results that may be called artistic. In brief, Art in Europe did not dawn until the early period of the iron age.

THE END.

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